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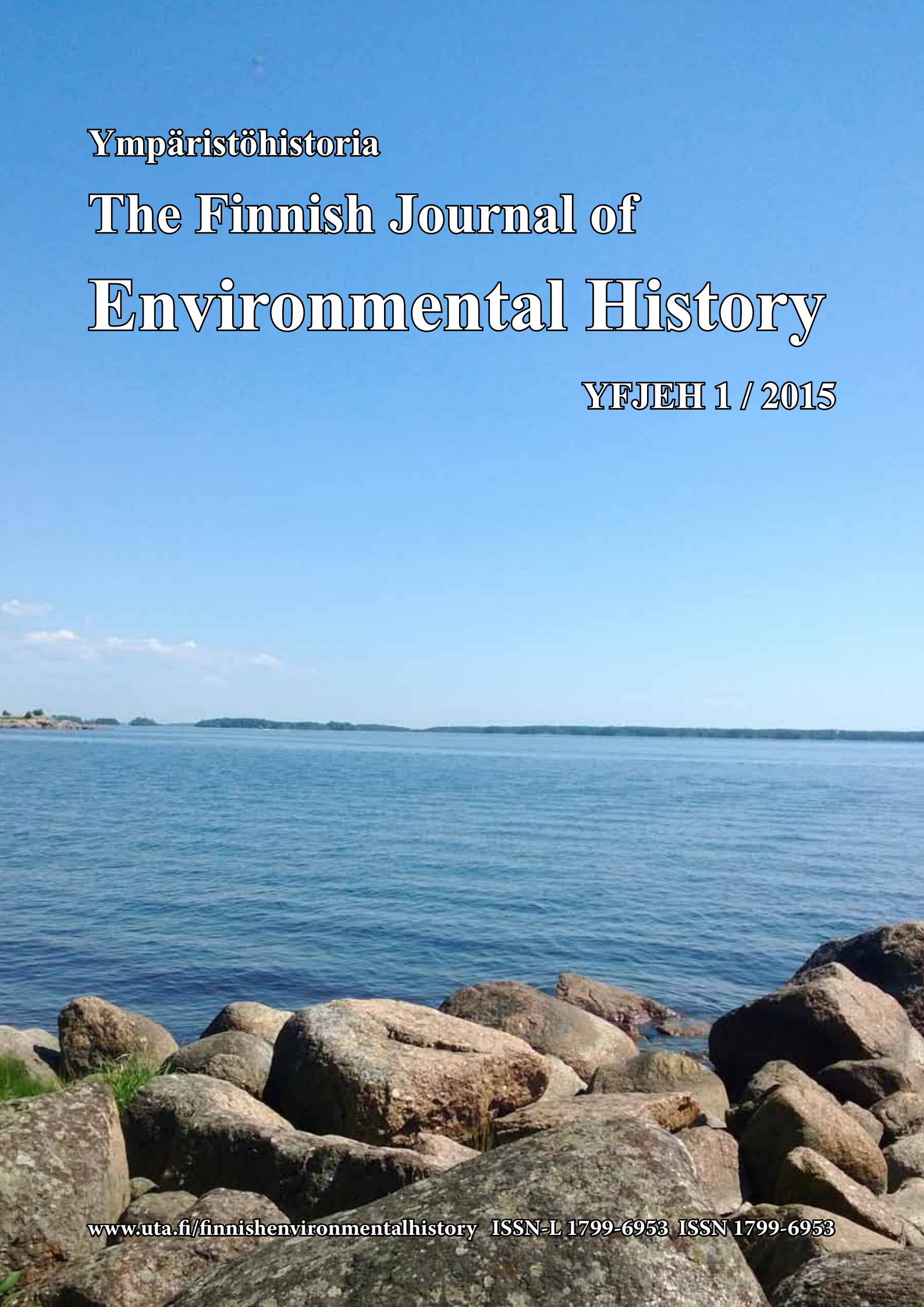

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FINNISH JOURNAL OF ENVIRONMENTAL HISTORY (YFJEH)

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Tapio S. Katko

Pääkirjoitus

Kohti tasapuolisempaa tutkimuksen arviointia

Viime vuosina on yliopistoja ryhdytty laittamaan paremmuusjärjestykseen erilaisilla kansainvälisillä arviointilistoilla kuten Shanghain lista, joka noteeraa voimakkaasti Science- ja Nature-lehdessä julkaistut artikkelit samoin kuin Nobel-palkinnot. Muun muassa eräät Aasian yliopistot ovat keksineet ”uusia innovaatioita” ja palkanneet nobelisteja listoilleen päästäkseen paremmin esille ko. vertailussa.

Voidaan kuitenkin kysyä, miten näillä luonnon- ja lääketieteitä suosivilla kriteereillä voidaan arvioida yliopistoja ja niiden vaikuttavuutta tai tuloksellisuutta yli tieteen rajojen. Kunkin tieteen tuloksia kun todellisuudessa voidaan mitata vain niiden omien tieteenfilosofisten ja tietoteoreettisten lähtökohtien ja lopulta niiden vaikuttavuuden pohjalta.

San Franciscossa solubiologit julkaisivat yhdessä tieteellisten lehtien ja julkaisijoiden kanssa joulukuussa 2012 toisenlaisen kannanoton “The San Francisco Declaration on Research Assessment (DORA)[1]. Olisi voinut kuvitella, että tällainen olisi enemmänkin noussut yhteiskuntatieteilijöiden suunnasta. Julistuksessa muun muassa suositellaan, että

- eliminoidaan lehtien vaikuttavuusindeksien käyttö, kun päätetään rahoituksesta, vakanssien täytöstä tai ylennyksistä
- arvioidaan kutakin tutkimusta sen omilla meriiteillä mieluummin kuin sillä perusteella, missä lehdessä se on julkaistu
- kehitetään uusia indikaattoreita arvioimaan tutkimuksen merkitystä ja vaikuttavuutta.

Yliopistojen tuloksellisuuden ja yhteiskunnallisen vaikuttavuuden arvioimiseksi tulisikin kehittää ja ottaa käyttöön ”kymmenottelukriteerit” nykyisen, yksipuolisen kansainvälisissä ranking-vertailuissa pärjäämisen sijaan. Nämä kriteerit lähtisivät ajatuksesta, että tutkimuksen yhteiskunnallisen vaikuttavuuden vuoksi tuloksia tulee julkaista eri muodoissa useilla eri foorumeilla ja: peer review lehdissä englannin ja suomen lisäksi myös muilla kielillä; tietokirjoissa; ammattilehdissä; aikakauslehdissä, sanomalehdissä, sosiaalisessa mediassa jne.

Suomessa ja monissa muissa maissa kehitys on kuitenkin kulkemassa juuri toiseen suuntaan. Eri julkaisumuodot eivät ole vaihtoehtoja vaan ne tukevat toinen toisiaan. Olisiko nyt sopiva aika laatia ”Tasapuolisemmat tutkimuksen arvioinnin kriteerit”?

1 San Francisco Declaration on Research Assessment (DORA). Putting science into the assessment of research. http://www.ascb.org/dora-old/files/SFDeclarationFINAL.pdf.

Tapio S. Katko

Editorial

Towards Better Balanced Research Assessment

International ranking lists of universities – such as the Shanghai list by the Shanghai Jiao Tong University, which values highly papers published in Science and Nature and Nobel prizes – have gained popularity in recent years. Some universities in Asia, for example, have made new questionable innovations and "hired" Nobel Laureates on their lists to place higher in the comparison.

One may, however, ask how well criteria that favour the natural and medical sciences can be used to assess universities and their impact across scientific boundaries. In reality, the results and efficacy of any science can be evaluated only based on its own ontological and epistemological principles.

In December 2012 the so-called San Francisco Declaration on Research Assessment (DORA) was announced by cell biologists and scientific journals and publishers. One would have rather expected such an initiative from social scientists. Among other things, the declaration recommends

- eliminating the use of journal-based metrics, such as Journal Impact Factors, in funding, appointment, and promotion considerations;
- assessing research on its own merits rather than on the basis of the journal in which it is published; and
- capitalising on the opportunities provided by online publication (such as relaxing unnecessary limits on the number of words, figures, and references in articles, and exploring new indicators of significance and impact)

Yet, in Finland and many other countries development is going in the exact opposite direction.

Instead of the current, one-sided criteria we should develop "decathlon criteria" for assessing the efficacy and social impact of universities. These criteria would be based on the idea that research results should be published in various forms in several fora to guarantee their social impact: peer review papers in English, Finnish and other languages; non-fiction books, professional and trade journals, magazines, newspapers, social media, etc.

Various forms of publishing should not be alternatives but support each other. Is this not the time to establish "Balanced Criteria for Research Assessment (BARA)"?

Editors: Petri S. Juuti, Tapio S. Katko, Harri Mäki & Riikka Rajala




Ilmo Massa

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Insights on sustainable social policy in Finland

Abstract

This article examines sustainable social policy development in Finland. Sustainable social development aims to ensure a reasonable standard of living, social security and a clean and healthy living environment for different social groups, families and individuals. The article is based mainly on secondary research materials consisting of research reports, statistics, and other written materials. Business- as- usual -approach might still be the best way to describe the state of Finnish sustainable strategy. Empirical research results give no indication that Finland is currently undergoing a hopeful greening process. However, you can see some promising signs for green economy and even green society. The main recommendation is that Finland should continue its path towards a more ecological sustainable development and use much more resources for that.

Key words: Finland, sustainable development, social policy, the politization of environmental problems, environmental sustainable index.

1. Introduction

Sustainable social development aims to ensure a reasonable standard of living, social security and a clean and healthy living environment for different social groups, families and individuals. Sustainable social policy does not reject the pursuit of individual welfare, nor economic development. Rather, it expands the interpretation of welfare by emphasising the significance of a clean living environment and the conservation of natural resources.

Traditional social policy addresses issues of sustainable policy more than is generally recognised.[1] In 1930, on the cusp of the Great Depression, J. M. Keynes[2], one of the founders of modern social policy, wrote the essay *Economic possibilities for our grandchildren*, in which he discussed the long-term outlook for the economy. He expressed the hope that developments in science and the economy would lead to a stationary state in terms of both the economy and social issues. This transition would take place peacefully once basic material needs were satisfied. A stationary state would not seek growth for its own sake, but instead cultivate mankind's special abilities, i.e., intelligence and social skills.

Keynes borrowed the idea of a stationary state from the classical political economist, John Stuart Mill.[3] In addition, the two significant British welfare state theorists William Beveridge and Richard Titmuss had an interdisciplinary view of the tasks of social policy. In his 1942 report *Social Insurance and Allied Services*, Beveridge[4] saw the use of natural resources for the benefit of the entire human race and future generations as one of the key prerequisites for sustainable welfare, while Richard Titmuss[5] was interested in the '*disservices*' or '*social costs*' of

1 Massa 1993a.
2 Keynes 1930/1963.
3 Mill 1848/1985.
4 Beveridge 1943/1963.
5 Titmuss 1968.

production, including the pollution of air and water, urban decay, the degradation of aesthetic values, the spread of diseases, and violations of privacy.

Heikki Waris[6], the founder of Finnish social policy research, included in his dissertation *Työläisyhteiskunnan syntyminen Helsingin Pitkänsillan pohjoispuolelle* extensive descriptions of the living conditions in the traditional working class area of Helsinki. Waris also noted the ongoing changes in the energy economy from renewable sources to the age of fossil fuels. In addition, the work contains detailed descriptions of the backward state of the fresh water supply and sewage in Helsinki in the 1800s, as well as the spread of diseases such as typhoid fever due to poor hygiene. It was health and pollution issues that eventually forced the city to build water and sewage system in the working class districts.[7]

In the 1960s Finnish social policy was still seen as an interdisciplinary design science and it was not until the following decade that social policy became more tightly integrated in the defence of the welfare state, at the loss of some of its interdisciplinary perspective. A similar development has occurred in other countries where social policy has existed as a scholarly discipline[8]. The specialisation of the discipline of social policy at this particular point in time can be considered paradoxical, since interdisciplinary research and perspective in social policy would be needed to reassess the sustainability of society.[9]

Fortunately, the old interdisciplinary tradition has not completely disappeared from research in social and public policy. This is not to refer Pekka Kuusi's[10] - very influential Keynesian social politician in Finland - work *Tämä ihmisen maailma* (This world of man), which, while interesting in the context of an environmental discussion, bears no mention of the concepts of the welfare state, or social or public policy. Instead, I invoke the German discourse of the late 1980s, including Joseph Huber's ideas of eco-social development.[11]

This article describes the intellectual history of sustainable social policy, its current manifestations, and finally, hints at the paths we could take to proceed further toward a stable, sustainable society. The main data of this article is the secondary research materials consisting of research reports, statistics, and other written material.

2. The politicisation of the environmental discussion in Finland

I will now focus on four themes of intellectual history which have influenced the political climate in Western industrialised countries and discuss them with the Finnish context. These themes have contributed to the politicisation of environmental issues and consequently to the development of a sustainable social policy. The politicisation of the environment means that a wide range of factors influencing the quality of the human environment have become topics of political disputes. These factors have had a strong impact on Finland through the media and academic research, even though the politicisation of environmental issues also carries some indigenous Finnish traits. I will examine this development from a historical perspective.

6 Waris 1932, 1934.
7 Laakkonen 2001.
8 Lönnroth 2006.
9 Massa 1993a, see also Frodeman 2010.
10 Kuusi 1982.
11 Huber 1982.

Concern for pollutants in the environment became more pronounced during the 1960s. One example of this is the battle against environmental pollutants generated by Rachel Carson's (1960) work *The Silent Spring*.[12] While the so-called Minamata disease, caused by mercury leaked from a chemical plant owned by the Japanese company Chisso in 1932-1968, was a local tragedy in the Minamata bay region, images of people suffering from mercury poisoning spread throughout the world.[13] Nuclear testing in the atmosphere, particularly the testing conducted in 1945-1963 led to objections from both the general public and researchers worldwide. Strange-sounding substances, such as cesium-137 and strontium-90, became topics of global interest, as the world struggled to understand them and the associated health risks. Significantly elevated cesium-137 levels were discovered in the milk, reindeer meat and people of Finnish Lapland, since the Northern economy was founded on the food chains typical of a nature-based economy.[14]

In Finland, the environmental discussion focused on water pollution caused by chemicals from the wood processing industry.[15] In the 1970s, nearly a quarter of the Finnish population resided near lakes and waterways contaminated mainly by the wood industry, even though municipalities also contributed to the pollution. Many lakes and rivers close to pulp mills were completely dead, and the waterways surrounding larger cities were unhygienic and unsuitable for swimming, but the Lievestuore lye pond was in a league of its own. The lye pond was created in 1935-1967, when Haarla Selluloosa Oy pulp mill pumped a potent lye solution into the Koivusuo swamp which was dammed. This led to the creation of a reeking pond of lye which seeped toxins into the soil and water. The restoration of the pond did not begin until the 1980s, and took close to twenty years.[16]

Another new theme of the global environmental discussion which gained popularity in the 1960s was the growing population of the planet and the related debate regarding the sufficiency of food. *Gränser för vår tillvaro* (The limits of our existence, 1967) by the Swedish food economy expert Georg Borgström[17] and *The Population Bomb* (1969) by American population researcher Paul Ehrlich[18] serve as examples of books discussing the population crisis and the sufficiency of food which garnered global interest and agreement worldwide as well as in Finland. According to the UN population outlook, the global population will grow from the current 7 billion to over 9 billion by the year 2050. Population growth is centred in Asia and in developing countries.[19]

Finland is one of the most sparsely populated countries in Europe and the world, but the theme of population growth is included in the Finnish environmental discussion as well. The food distribution system of modern Finland is ostensibly well buffered for crisis situations. Due to the climate fluctuations of its northern latitude, the agricultural production of Finland has traditionally been vulnerable. The nation relies partially on import for its food reserves, and is particularly dependent on imported oil which is difficult to replace.

12 Carson 1960.
13 McNeill 2000, 138-139.
14 Massa 1994, p. 254
15 Haila & Ryynänen & Saraste 1971.
16 Pihkala 1982, p. 523, Massa 1994,p. 224, Lipeälammen kunnostaminen 2011.
17 Borgström 1967.
18 Ehrlich 1969.
19 United Nations 2011.

The severe famines of 1696-97 and 1867-68 in the area which are now called Finland, should not be forgotten, even though developments in agricultural technology have seemed to liberate farmers from the risks of nature-based farming.[20] These same risks became pertinent during the World Wars in Finland – no more than a few decades into the past. Clear signs of malnutrition were apparent in the rural areas of Finland during the First World War. Food rationing for the Winter War (1939-1940) began in October 1939, but initially only covered sugar, coffee and grain. The Continuation War (1941-1944) broadened the scope of rationing to include most foodstuffs, and normalcy did not return until the early 1950s. Finland only survived the food crisis of the Continuation War thanks to imports from Germany. While old photographs show a gaunt population, their diet was paradoxically healthier than ours, as it contained large quantities of vegetables and tubers.[21]

The third important theme was the awareness of the significance of fossil fuels as the foundation of the modern economy. This theme gained momentum during the 1970s, and was discussed in the *Limits to Growth* (1972) report, issued by the Club of Rome.[22] One of the key tenets of this report is that in order to survive the future, humanity must change the direction of its development or face a global crash claiming millions, if not hundreds of millions of victims. According to the report, the limits of growth will be reached before the year 2100, resulting in complete devastation. In order to avoid this crash, models from green economies, such as the recycling of resources, should be applied to the economy on a global scale. Energy should be generated through solar power and renewable energy sources. Birth control methods should be employed worldwide. Only a few thousand copies of the *Limits to Growth* were sold in Finland, but the message of impending catastrophe was spread efficiently by the media, and left its mark on the whole decade.

The oil crisis of the winter of 1973–74, which brought the real prices of refined oil products to the levels of the 1940s and 1950s, highlighted the risks of excessive centralisation and mechanisation even more powerfully. The oil crisis was a shock to a generation raised to believe in the ideology of continuous growth. In Finland, even the weekly television broadcast hours were reduced. The oil crisis pushed Finland into an "era of energy policy', as public authorities began to control the development of energy policy more closely.[23] A fervent search began for solutions to replace or conserve oil, as it did in other Western market economies which allowed the price of oil to increase freely. The Finnish energy policy of 1979[24] stated energy conservation and the increase of domestic energy as its objectives. A laboratory for domestic fuels was established in Jyväskylä in 1978.[25]

But the oil crisis was quickly forgotten, and with it, the limits to growth. The general public barely even noticed the second oil crisis of 1979, which nearly doubled the price of crude oil.[26] In the 1980s, the new ethos of economic growth obscured energy questions almost completely from the public discourse. As the money market was deregulated, cheap money started streaming into the country, bringing affluence and prosperity with it. However, despite its favourable price development, the relative proportion of oil-based power in all energy consumption has

20 Åström 1978, 43-58, Lappalainen 2012.
21 Laurila 1985, 89–91.
22 Limits to Growth 1972.
23 Ruostetsaari 1989, 108.
24 Komiteamietintö 1979.
25 Massa 1982,131.
26 Massa 1982,131.

been in slow decline since the oil crisis of 1973. In its stead, the use of peat, nuclear power and natural gas has increased. The portion of fossil fuels in all Finnish energy consumption was at its peak in the mid-1970s at nearly 80%. In 2011, this figure was still at 44%.[27]

The discussion on peak oil and the depletion of global natural resources in the 2000s have kept the limits of growth as they were conceived in the 1970s in the popular consciousness.[28] Peak oil means a turning point where maximum oil production is reached and after which production will inevitably begin to diminish, as oil reserves become smaller.

The fourth and newest global environmental theme is climate change. Most climate researchers are convinced that increasing the use of oil and other fossil fuels will change the global climate in the coming decades. According to the current understanding, an average global temperature increase of more than two degrees centigrade would cause a world-wide crisis. These changes may be taking place faster than previously estimated.[29] What will happen in a northern country like Finland?

A great deal of information regarding the impact of climate change on Finland is easily accessible so that there is no need to go to the details.[30] I will raise only three observations on the possible impact of climate change in Finland. Firstly, annual fluctuations in climate have always been significant in the North, and from this perspective, climate change will merely increase the number and intensity of such fluctuations. Climate change may even be beneficial to Finland, if it results in an extended growing season and a decreased need for energy for heating. Such calculations, however, are at best naïve, if they picture Finland as an island separated from the rest of the world.

Secondly, climate models suggest that the greatest changes in climate would take place on the northern latitudes, with an expected temperature increase of over five degrees by the end of the century. Recently climate researchers have focused on the fact that the even glaciers of the Arctic Ocean have diminished during the summer season at a much faster rate than expected, and on its potential consequences on the global macroclimate, such as ocean and air current.[31] This will have some effect also in weather patterns in the northern countries like Finland.

Thirdly, some recent predictions[32] indicate that global warming cannot be halted at two degrees. Instead, temperature increases of four or even six degrees are possible. Certain climate researchers suggest that global warming caused by the increase in greenhouse gases is currently reaching a tipping point, after which the smallest increase in temperature may cause abrupt, irreversible and unforeseen changes to the climate system of the world. [33] Such development would even lead to shortages of food and fresh water as stated also in the Finnish strategy for sustainable development.[34]

27 Statistics Finland 2012,129.
28 MA, 2005.
29 NASA 2012.
30 Climate Guide 2012.
31 Vidal 2012.
32 World Bank 2012b, The Global Carbon Project 2012.
33 Wassman & Lenton 2012, Nuttall 2012.
34 Finland's national strategy for sustainable development 2010,5.

In general, many problems of sustainable development have become politicised and require swift reactions also in Finland, as they do from the global community. Finnish environmental history is the mixed selection of some international and home-made themes.

3. The governance of the sustainable social policy

The basis of sustainable development policy is the *Our Common Future* (1987) report issued by the World Commission on Environment and Development, known better as the Brundtland Commission after its chair Gro Harlem Brundtland, who was the prime minister of Norway at the time. The report was translated also into Finnish and was published in the following year (Yhteinen tulevaisuutemme 1988).[35] The report was the first to introduce the definition of sustainable development: the needs of the current generation must be addressed without compromising the needs of coming generations. The report describes the world as being in a total environmental crisis, but considers a shift to sustainable development as possible. The concept of sustainable development implied that it is possible, through the evolution rather than revolution to develop the society to more sustainable. The greatest significance of the report may be its connection of a functional economy and balanced social development with ecological scarcity, and its insistence that all three themes be considered simultaneously.

"Sustainable development" has irrefutably become a media buzz word in Finland. The search term "kestävä kehitys" ("sustainable development") appears in the digital archive of the *Helsingin Sanomat,* the biggest and most influential newspaper in Finland, from 1990-2011 an average of 324 times a year.[36] Interestingly, no growing trend in the use of this term is apparent. Instead, its use fluctuates arbitrarily from one year to the next. The term *"kestävä kehitys"* was most often used in 2005 (372 times) and least often in 2011 (191 times).

Finland has been very successful in several international comparisons measuring sustainable development. Sauli Rouhinen argues that Finland is among a group of countries which persistently rank at the top in sustainable development, i.e., Austria, Denmark, France, Germany, Hungary, Luxembourg and Sweden.[37] The World Economy Forum ranked Finland at the top of its *Environmental Sustainability Index ESI* for three years running until 2005. The 2005 top five also included Norway, Uruguay, Sweden and Iceland.[38] The success of Finland and other Nordic countries in such rankings can be explained with the countries' rich natural resources, strong economies, low population and strong tradition of governmental control. Finland's biocapacity in global hectares is the largest in Europe (12.2 gha/person) and the seventh largest in the world.[39] Finland has the most forest in all of Europe, covering 75 per cent of the country. These provide good opportunities for forestry, bioeconomy, renewable energy and for natural products such as berries and mushrooms. With the exception of carbon dioxide emissions, Finland has not increased its emissions in the past decade, despite a simultaneous increase in production and consumption.[40]

Does an index-based assessment provide a realistic image of the Finnish situation? Not necessarily. According to the *Sustainable Development in the European Union* report by

35 *Our Common Future* 1987, Yhteinen tulevaisuutemme 1988.
36 The digital archive of the *Helsingin Sanomat.*
37 Rouhinen 2013.
38 Esty et al. 2005, 4, 21.
39 Rouhinen 2013.
40 Towards Sustainable Choices 2006, 60.

Eurostat (2011a, 11), the sustainability of the countries in the European Union cannot be comprehensively assessed, as no political or scientific accord exists regarding the significance of sustainability or of the optimal levels of several indicators cited in the report.[41] Index comparisons are also time-specific and ignore historical and political differences between the countries. The latest comparison of indices related to sustainable societies issued by *The Sustainable Society Foundation* (2012) places Finland slightly behind the very top in an overall ranking. In environmental sustainability Finland ranks as the thirteenth in Europe and the 103rd in the world. This is due to the considerable Finnish greenhouse gas emissions and extensive consumption of natural resources. These results for Finland's environmental sustainability are radically different from previous comparisons and give both Finnish politicians and the general populace cause for introspection.[42]

I will now examine the preconditions of Finnish sustainable social policy from a different perspective, using a model created by the German environmental policy researcher Martin Jänicke[43] (1992, 1997, Jänicke & Mönch 1988, 1990). The most important preconditions for a successful environmental policy in Jänicke's model are a strong and functional economy, favourable natural conditions and resources, a strong tradition of governmental regulation, flexible institutions and competent public servants, a solution-focused multidisciplinary perspective and research in social sciences as well as high-quality education and training. In the following section this model is used to evaluate Finland's sustainable public policy.

The Finnish economy has been in a boom for the past few years, and the country ranks among the strongest economies in the European Union. Historically, however, an image of an unstable economy dependent on foreign trade is closer to the truth.[44] The latest recession took place in 2007–2009, and the country is again facing an economic downturn. After a sustained average growth of three per cent since the recession of the 1990s, Finland's GNP decreased by ten per cent during the global economic crisis of 2008–2009. At the time of writing – early June 2013 – Finland's economy is in negative growth with predictions indicating continuing economic problems in the end of the year.[45]

Forestry persists as a core industry in Finland. The past years have not been easy, but some areas of the Finnish forestry sector, such as fine paper production, continue to rank highly worldwide. Nevertheless, the added value of Finnish industry has been declining, with a four per cent decrease in 2011 from the previous year. Mining and quarrying alone are experiencing swift growth at 105 per cent. The Finnish economy has become more service-focused and its environmental impact has lessened as part of the production chain of some Finnish products has been transferred abroad.[46] However, climate change continues to progress regardless of where in the world the emissions are increasing. Thus the oft-repeated idea of an emphasis on service production being a solution to the global environment crisis is a fallacy.

Finland is also globally one of the top material consumers. The ecological footprint of a Finnish resident is the fifth largest in the world.[47] Energy consumption per capita in Finland is

41 Eurostat 2011a,11.
42 The Sustainable Society Foundation (2012)
43 Martin Jänicke 1992, 1997, Jänicke & Mönch 1988, 1990.
44 Pekkarinen & Vartiainen 1995, 115–128.
45 Statistics Finland 2013. These problems have continued after that.
46 Statistics Finland 2012.
47 Statistics Finland 2012.

the second highest in Europe after Luxembourg, even though the portion of renewable energy sources in consumer energy was the third largest in Europe after Sweden and Latvia. Finland consumes the most electricity of all EU member states. Finland has the most road traffic per capita.[48] In 2009 Finland's carbon dioxide emissions per capita were 10.4 tons, when the average in the European Union is 7.5 tons. In Sweden the corresponding figure is half of that in Finland at 5.0 tons.[49]

The overall consumption of natural resources declined after the oil crisis of the mid-1970s during the recession of the early 1990s, and after the recession of 2008–2009. The impact of the Finnish economy on the consumption of natural resources in other countries has simultaneously risen radically. The direct input of import has more than doubled in 41 years, and the impact of the hidden flows more than tripled. In 1970, international imports accounted for more than one quarter of the overall consumption of materials, while in 2010, imports contributed one half of overall consumption.

However, during the last few years, the market for the products of environmental technologies has increased more quickly than overall market development over the past few years and has seen an increase in product selection. This rapid growth is expected to continue in the future in Finland, due to increasingly strict environmental legislation, new environmental and climate treaties and the escalating prices of conventional energy.[50] Some innovative energy policies and new technologies have been developed in Finland. For example, in total 192 user inventions, designs and add-ons were found in air and ground source heat pumps and wood pellets.[51]

Finnish nature poses both limitations and opportunities for sustainable development. The country lacks indigenous sources of fossil fuel (excluding peat from the list of fossil fuels). Instead, these key energy sources of the industrial growth economy must be imported. Sources of water power are relatively few compared to Sweden and Norway, and most of them have been harnessed. The cold and dark winter translates to an exceedingly high consumption of heating energy. Freshwater storages are plentiful, and most waterways are relatively clean. In terms of nature and natural resources, Finland has many opportunities for considerably increasing its solar and wind energy output. Finland has ambitious plans for increasing the ratio of renewable energy to gross energy consumption to reach goals set by the EU. By developing its nascent feed-in tariff policy, Finland could rapidly increase the production of renewable energy sources. This policy encourages energy producers to use small-scale wind power or similar energy sources by increasing the guaranteed tariff on small-scale energy production.[52]

How have Finnish authorities worked for sustainable development policy? Under Prime Minister Esko Aho, the Finnish Government established the Finnish National Commission on Sustainable Development in 1993. Its mission is to promote sustainable development and to be an advisory organ in matters related to the UN and its Commission on Sustainable Development. The authority of the Finnish Commission has been increased by the fact that initially, as in the latest Commission, the Prime Minister served as the chair. Both the strength and partially the weakness of the National Commission on Sustainable Development is that it comprises representatives from all walks of life. Sauli Rouhinen (2013), however, believes

48 Statistics Finland 2012,131–145.
49 Statistics Finland 201).
50 Mikkanen et al. 2006, Helynen 2004.
51 Hyysalo et al. 2013, 498.
52 Ministry of Employment and the Economy 2011, Jokela 2012.

the true strength of Finland is that the policy for sustainable development is continuous, irrespective of changes in government.[53] Other Nordic countries have no equivalent broad-based organ, relying as they do on the sitting government to follow its social policy.

The Commission on Sustainable Development approved a new national sustainable development strategy in 2006. It depicts the Finnish objective and vision as "to assure well-being within the limits of the carrying capacity of nature nationally and globally. The objective is to create sustainable well-being in a safe and pluralistic society in which all people take responsibility for the environment".[54] The Finnish Government, led by former Prime Minister Jyrki Katainen prepared a Government Foresight under the title *Government Report on the Future: well-being through sustainable growth.* It includes a business-as-usual interpretation of sustainable development circling around the concept of sustainable growth.[55]

What is Finland's position in the EU's sustainable social policy? Different estimates, based on different arguments, are available on this question. Rouhinen identifies Finland as a part of a group of countries which has sought to enhance the impact of the European Union's sustainable development strategy.[56] Other countries in this group are Austria, Germany, the Netherlands, Belgium, France, the UK and Switzerland, which is not a member state. Wurzel (2013, p. 90-91) positions Finland in the EU's "green sextet", together with Denmark, Germany, the Netherlands, Austria and Sweden.[57] Based on the results of some case study research relating to environmental policy, Finland defends the EU's environmental policy when it does not endanger the country's financial competitiveness or pose problems for governance. At least in the early stages, Finland has not been a pusher of new ideas, following instead the lead of other countries. In this sense, Finland has been significantly different from more active Denmark and Sweden. Finland has typically feared drifting to the fringes of the European Union. As a consequence, it tends to follow the Union's guidelines closely. Rouhinen (2013) also points out that the focus of Finland's environmental influence has remained on national policy.[58]

According to an OECD (2006) report, Finland imposes the fourth highest environmental taxes after Denmark, Turkey and the Netherland.[59] A total of approximately EUR 5 billion in environmental taxes and fiscal levies were collected in 2010. The ratio of such taxes and levies to all tax revenue and statutory social security payments was 6.6 per cent in 2010. This percentage is slightly lower than the EU average).[60] However, Finnish authorities have been quite cautious regarding an ecological tax reform. A report by the Ministry of Finance (2004) suggests that a tax reform which would benefit the environment while simultaneously promoting well-being and employment may not be plausible.[61]

The ratio of environmental investments to all fixed investments in industry decreased in 1992–2010 from approximately ten to just over four per cent.[62]

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53 Rouhinen 2013.
54 Towards Sustainable Choices 2006, 3.
55 Government Report on the Future 2013.
56 Rouhinen 2013.
57 Wurzel 2013, 90-91.
58 Andersen & Liefferink 1997, Sairinen & Lindholm 2004, Rouhinen 2013.
59 OECD 2006.
60 Statistics Finland 2012,156.
61 Ministry of Finance, 2004.
62 Statistics Finland 2012,164.

Research related to sustainable development is conducted both at universities and research institutes operating under the auspices of government ministries, such as the Finnish Environment Institute, MTT Agrifood Research Finland, the Finnish Forestry Research Institute and the VTT Technical Research Centre of Finland. Most of this is scientific research aiming to develop new technologies. The solution-focused and policy relevant research and multidisciplinary research are rather disorganised. It remains to be seen what will happen when a new Natural Resources Institute Finland gets going at the start of the year 2015. It will bring together expertise in forest, agriculture and food industries, and game and fisheries.

Finland, like the rest of the European Union, is still widely and robustly unanimous regarding the importance of environmental protection. Nevertheless, the image of Finns as an environmentally conscious people in comparison to other European countries does not receive unambiguous support from the comparative research on environmental attitudes conducted by Eurostat.[63] Close to half of all Finns, 44%, thought of environmental protection as personally "very important", while the European average is 58%, with 83% of Swedes delivering the same answer. The differences are smaller for many other attitudes. The ratio of people thinking of environmental protection in negative terms in Finland rose by seven per cent since the last measurement (2007).[64] One explanation for this fairly subdued image of Finnish attitudes towards the environment could paradoxically be the fact that environmental issues have become thoroughly politicised in the country. The changes in politics are more directly reflected in the attitudes of the populace than in other countries. At least the *green backlash*, meaning opposition evoked by the green ideology and politics, has perhaps been more intense and wider in Finland than in many other countries. As an example, the Natura conservation programme channelled much general dissatisfaction towards the EU and rural politics in Finland.[65]

The 2009 comprehensive national sustainable development assessment indicates that integrating the different perspectives of sustainable development and wide-reaching sustainability thinking are rare in Finland. While the factors related to the environment and sustainable developments are well represented in rhetoric, they have led to no concrete measures or significant decreases in environmental stress.[66]

Overall, the ideas of sustainable development, which circulated only in small expert circles and grass-roots organisations in the early 1980s, have risen to the agendas of governments and public authorities. The emergence of organic products and the organisation of waste management are good examples of this. Even in the business world, some companies are serious about sustainable development and even consider it a competitive advantage. The process itself is nevertheless slow, and some can be attributed to so-called green washing, a superficial environmental attitude which goes no deeper than advertisement and rhetoric. Companies are trusted to be innovative in issues of sustainable development, and both the VTT Technical Research Centre of Finland and The Finnish Innovation Fund Sitra have programmes supporting such innovation. Sitra's environmental programme Cleantech Finland aims to enhance the export and internationalization of environmental technologies. The website of the Cleantech Finland project (2012) cites the turnover of Finnish clean technology as EUR 20.1 billion, and the number of businesses involved in clean technology in Finland as 2,000.[67] However, Statistics

63 Eurostat 2011b,9-11.
64 See also Statistics Finland, *Ympäristötilasto 2012*,183-196.
65 Oksanen 2003.
66 Ympäristöministeriö 2009.
67 Cleantech Finland 2012.

Finland estimates the value of this environmental business at ten per cent of that figure (EUR 2.1 billion), and the number of full-time businesses in the field as 777.[68]

The extent to which Finns became accustomed to the noxious emissions of the wood refining industry is a good example of how a country may encapsulate serious environmental and development problems in a cultural framework. Before the 1960s the pungent emissions from wood processing plants were tolerated as they were thought of as "the smell of money". However, people residing close to wood refineries suffer not only from the unpleasant smells associated with the emissions, but also a higher than average incidence of headaches, nausea, sinusitis and conjunctivitis or "pink eye". According to Jauhiainen (2003, 609-612), the smell of cellulose has become a matter considered not suitable for discussion, for example among officials in the city of Oulu. The reason for this is both the historically established position of the wood refining industry in Oulu and a desire to maintain the city's image as a clean, global centre of technology.[69]

In Finland the *Kohti hiilineutraalia kuntaa* (Towards a carbon-neutral municipality) - project led by the Finnish Environment Institute is an encouraging example of a project which could aid in the generation of a sustainable welfare state.[70] This project employed the towns of Uusikaupunki, Mynämäki, Kuhmoinen, Padasjoki and Parikkala as volunteer small-scale laboratories to experiment with reductions in carbon dioxide emissions. Public authorities have clearly taken the initiative, but the project also connects municipalities, companies, residents and experts to plan and implement solutions to curb greenhouse gas emissions. These kind of bottom-up possibilities to build up the more greener society are very topical and effective way to proceed also in future.

When reading the impressive range of sustainable development reports issued by the authorities, one could easily conclude that Finland has already graduated to a sustainable social policy. Sustainable development and, recently, the green economy feature in nearly all of the development programmes of government ministries. However, Annukka Berg suggests that for example the Finnish programme for sustainable production and consumption featured ritualistic traits intended primarily to strengthen the prevailing political culture.[71] This research only focused on a single programme, but it implies that similar traits may be present in other sustainable development projects. A Finnish sustainable strategy is now evolving and we don't have sufficient information to assess what will come out for that. The most critical dimension of the Finnish sustainable strategy a high consumption society and possibilities to change course from a society based on a high consumption to a stationary society.

68 Statistics Finland, Ympäristöliiketoiminta 2012.
69 Jauhiainen 2003, 609-612.
70 Ympäristöministeriö 2012.
71 Berg 2012, 9.

4. Conclusion

Business -as -usual might still be the best way to describe the state of Finnish sustainable social policy strategy. The most critical dimension of the strategy is a high consumption society and high-resource use society. Now we can see some signs for more green economy and even green society. However, empirical research results give no major indication that Finland is currently undergoing a hopeful greening process.

Finnish sustainable social policy has often been mere symbolic policy, rendering economic growth, international competition and green consumption acceptable in principle. The benefits gained from reducing the environmental load are lost if savings from dematerialisation trigger an increase in consumption (*rebound effect*).

The global ecological scarcities which can seem "too large' become often culturally encapsulated in the Finnish economy and society. As a result, problems which should be addressed are ignored, or addressed very slowly and ineffectively. The cultural encapsulation will also prevent the politicisation of the important sustainable issues.

There might be a need to a return to a more strong and proactive state, which can coordinate the sustainable strategies of government, business and research.[72] In such ecological welfare state, as you can called it, the themes related to the environment and natural resources receive increasing emphasis in public administration, when previously they have been easily pushed to the side lines or even completely ignored.

5. Discussion

One result of the article is the following conceptual model (Table 1) which portrays how environment, culture, historical transitions and turning points, the governance of the sustainable development and environmental policies of the everyday life interact in shaping constructions of sustainable social policy. In the table the attempt is made to present the key conceptions of the sustainable social policy. The utility of this perspective is demonstrated by the insights it brings to understanding the relationship between historical time, social context, and adaptive strategies.

72 See, for example, Huber 2000, 280–283, WBGU 2011.

Table 1. Key conceptions of the sustainable social policy

Concept	Definition	Example(s)
The politicisation of environmental issues	Stable patterns of nature, the changing patterns of ecological scarcities.	The pollution of the lakes, energy crises, climate change.
Historical transitions and turning-points.	Depressions and booms, war periods, environmental and natural catastrophes.	The effects of the WW II, the type of industrial economy, economic, switching political and economic alliances.
The governance of the sustainable development.	The tradition of sustainable regulation, the development of the welfare state, the position citizen movements, sustainable research and education.	The establishing of the environmental ministries, integration of the environmental governance, open democratic society, high level universities.
Environmental policies of the everyday life.	The development of the environmental consciousness, conscious decisions that people make to change their life courses.	Environment as a part of cultural discourse and environmental biographies.

Environmental-cultural roots refer to early experiences that provide permanent "environmental roots" like climatic patterns which last through the histories of the certain country. Historical transitions and turning-points like depressions and booms have been tremendous effect on environmental use and environmental governance. The governance of the sustainable development means that in a modern societies a growing number of the characteristics of reality have entered the sphere of political regulation and planning, in Finnish case from world political through EU politics and national sustainable policies. The planning does not imply ideologies and party politics but rather environmental policies of the everyday life and the questioning of self-evident truths. What was defined before by nature and tradition have become objects of human reflection and decision.

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Drainage in Ancient China: Historical Wisdom and Lessons

Abstract

China as a country has an extensive history of drainage engineering. However, the purpose of drainage in the ancient ages was for flood control, river management, irrigation, urban water supply and waste water management, storm water drainage, etc. Also, the ancient Chinese society was made up of the rural society and the urban society. Accordingly, the functions of drainage in the rural areas was for flood management and irrigation purpose, and that of the urban area was also for managing flood, storm water and waste water control. According to the idea of Chinese ancestor, riverside was strongly considered as a major priority before a city is established. However, almost all the early influential cites in China were established near the rivers, just like Xi'an, Beijing, Nanjing, etc. During the ancient ages, the city governors did not only apply great efforts in developing water supply system continually in the cities, but also improved the drainage systems at same time. The archeological evidence showed that drainage facilities have long existed at the early city in Henan province in 2300 BC. Therefore, it was also evidenced that drainage system began from early designs and was developed along as the city develops. The traditional water system comprises of drainage system that had been in existence in most Chinese Cities before the current great urbanization in the 1980s. Thus, the incomplete drainage system of the current rapid urbanization process has brought more and more problems like storm flood and water pollution which does not just occur frequently in common cities but also in major cities like Beijing, Tianjin, etc. As a result, it requires us to rethink on the drainage situation in the current enlarging process of the cities, and to proffer solutions especially by learning from history. Therefore, this paper aims to explore the idea and process of the drainage in the history of China and the lessons learnt from history so as to proffer solution to water risk in current urbanization.

Keywords: China Drainage, Historical Wisdom, Lessons

Introduction

After 1980s, China was involved in rapid urbanization. Consequently, almost all the cities have involved in an enlarging process. Urbanization has effectively promoted the urban development, but has also brought obvious problems simultaneously; for example, incomplete drainage system had brought more and more problems like storm flood and water pollution which does not just occur frequently in common cities but also in major cities. In 21 July, 2011, Beijing, the capital of China experienced a rainstorm flooding with rainfall of about 164mm that was recorded as the highest rainfall in past 61 years. The area of 14000 km^2 in the city with 1.9 million people was affected leaving 77 dead in this rainstorm[1]. In recent years, rainstorm has

1 Baidu, 2011

also brought disaster frequently to other major cities like Wuhan, Hangzhou and Nanchang. This situation requires us to rethink on the drainage situation of the city's enlarging process, especially to learn from history for solution. Therefore, it is a fact that China has an extensive history of drainage engineering, as many cities and resident areas formed and developed have successful drainage engineering. Thus, this paper aims to explore the logic and process of the drainage in ancient China and the lessons learnt from history in order to proffer solution to flooding risk in current urbanization.

The history of drainage in China was dated back 4000 years ago[2]. The archeological evidences showed that the drainage facilities had been in existence in the early city of Henan province in 2300 BC. Therefore, it was also evidenced that the construction of drainage system began from the cities early design, and was developed along as the city grows. In the subsequent ages, the drainage system had been developed with the city's development which was incorporated with the urban water system construction. Furthermore, it has also achieved a traditional model of urban drainage before 1980s. Simultaneously, drainage in rural areas has played an important role in agricultural and community development, especially in the river basins and lake countries. The purpose of drainage from the ancient times was for flood control, river management, irrigation and urban waste water management.

In the early age of the cities in China, the major river basins were strongly considered to be the site of the city, especially the Yellow River basin and the Yangtse River basin. However, all the influential ancient cities in China were built near the major rivers, including the 8 most influential ancient capital cities such as Anyang, Changan, Luoyang, Kaifeng, Nanjing, Hangzhou and Beijing. For example, Anyang, the oldest capital city of China, was built across the riversides of the old Heng Shui(洹水) River. Chang'an, today's Xi'an City, was built near 8 rivers such as Wei(渭) River、Jin(泾) River、Lao(涝) River、Feng(沣) River, etc, and it was regarded as the capital city for 1700 years by thirteen dynasties. Kaifeng city is located at a place between the Yellow River and the Huai River. Also, Nanjing city is located at the south riverside of Yangtze River[3].

Being situated close to rivers, the city was convenient for water supply and irrigation, and this later made transportation convenient. Though a city built close to the river side is at a high risk of flood, the emperors and the governments in any of the dynasty has employed measures to counterattack flood disaster from its early construction to aged times. Accordingly, the history of drainage in China began with the city's early construction. Consequently, when a place has been chosen to be the site for the establishment of a city, drainage was first designed for the water system. Also, when planning a city as the capital, usually the city founder has to construct canals to bring water from the river nearby into the city for water supply. Similarly, the city founder has to construct other canals to direct used and waste water from the city into the lower basin of same river where the water supply canal linked. Therefore, this was the model designed as the system of water supply and drainage in the ancient city of China in general. Inside the city, water supply and drainage system are usually built for palaces preferentially, then for others resident areas. Accordingly, the model of water system in ancient city usually combines (1) Water supply system: It was a canal or river to introduce water into the city. (2) City's rivers: They are rivers or canals flowing inside the city as a water-cycle system with the functions of water supply and drainage. (3) Draining channel: The network of draining channel was built in palace and resident areas. However, some are underground channel and some are

2 Du Peng Fei, Qian Yi.1999
3 Jin Huai Chun 2005

upper channel for draining waste water and rainwater into the city's rivers. (4) Ponds: It was built or naturally linked with the city's rivers and functions as a sluice and waterscape. (5) Fosse: A canal commonly built to surround the town with the functions of the defense and sluice, and the canal linked with the city's water system. (6)Draining river: It was the river that passed the city or canal to direct water from the city into the lower basin of the river with the function of draining water from the town. By this systemic design, water was introduced from the nearby river to supply the city, and after cycling in the city through the water system, it then flows into the lower basin of the rivers. Also, the drained waster and rainwater from the town also flows into the lower basin of the river as well. If rainstorm is coming, the city's rivers, ponds and round town-fosse will perform the function of sluice for the storm water to reduce the risk of flooding. (Fig 1)

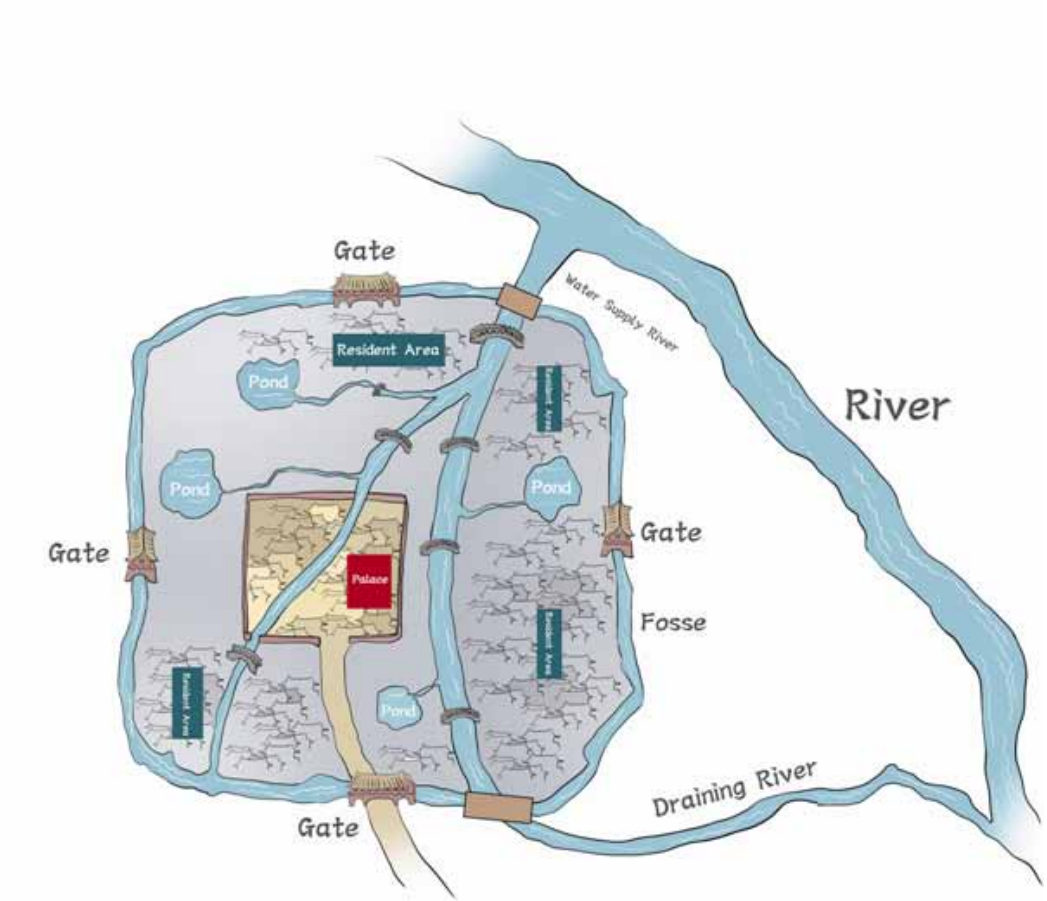

Figure 1. The urban water system of ancient China in general

The Development of Drainage in the Ancient Ages

The earliest event of water governance documented as well as a most popular folklore in China is the story of Da Yu Governance Water. According to the story, in that time of Da Yu's life (around 2000 BC), Yellow River was flooding frequently in its' middle basin where the ancestors of Chinese were inhabited. However, so much efforts has been put in place by the leaders of the local tribe groups in governing flood but was not effective. Da Yu, the son of the leader of the tribe groups was appointed to continue governing the flood after the works from his father and forefathers failed. After a filed survey, he found that the failed works of the flood governance was foregone because of the false measure of just making more dams and mounds to stop flood from the basin of the river but neglected how to manage the water after the mounds. So he changed the idea of water governance from stop water to lead water into the East Sea. He led people to dredge the rivers up in great force to direct water into the sea successfully; after that, flood was effectively governed and Da Yu became the first emperor of Xia Dynasty of China. "Water has to be led and not just be stopped", the logion of Da Yu was the most important idea of water governance but it had been deeply influenced by the Chinese society not only for water management but also for social management for thousands of years. It is a fact that this story also was the event of the earliest storm water drainage in Chinese history.

China is an agricultural based country, and so, the ancient society of China is combined of both the rural and urban societies. Accordingly, the functions of drainage were separated in the rural areas and the urban areas; drainage in rural areas was used for governing flood and irrigation while that of the urban area was for governing flood, storm water and waste water.

Archeological evidence showed that China has an extensive history of urban drainage. Therefore, according to the archeological discovery, dated back to 2300 BC, the urban drainage facility was built in the cities. Earliest drainage facility was discovered in the old town Pingliangtai(平粮台) of Henan province. However, what was remarkable from the discovery was that the pottery used for the construction of the downcomer inside the town (i.e. some earthen pipelines for drainage) was found to be used in building an underground drainage system under the street[4]. In 10~15 century BC in the Shan dynasty, urban development in Centre China was developed into a golden age, and many major cities were formed near the Yellow River basin as well as urban drainage was also improved accordingly. Archeological discovery from Xihaocheng town (偃师西亳城), today's Yanshi（偃师）city of Henan province shows that systematical drainage system had been built inside the city. According to the archeological works, the city was around 1.9 million M2. There was an underground sewer with a length of 800m which serves as the main urban drainage sewer from the East Gate to the palace; and inside the palace, there were branch downcomers which formed a well-designed drainage system for draining rainwater and waste water. Hence, the underground sewer with a breath of 1.3m and a height of 1.4m directs water from the palace and town into the fosse[5].

In 1100~221 BC, many kingdoms were established in Centre China close to the Yellow River basin and Yangtse River lower basin, as a result of it. Thus, there were many cities that were formed, and they brought a golden age on the city's history of China. Along with urban development, urban drainage techniques have also improved to a great extent. Archeological discovery shows that the urban drainage has developed on a high level in Lingzi city(临淄), the capital of Qi kingdom in today's Zibo city (淄博) of Shandong Province. During that time,

4 Henan Institute for Cultural Relic 1983.
5 Henan group 2 of Institute for Archeology 1985.

Lingzi city was a major city with a population of 300,000 and 15 km^2 in size. A complex water supply and drainage system was built combined with river, drainage ditch, pipeline and the fosse. The city built closes the river and linked with fosse. Also, three sewer networks were built in the city, gathering waste water and storm water into the fosse and again directing it to flow into the lower reach of the river[6]. According to the archeological digging, a major draining station was found under the west Rounding Town-Wall. The structure was made of stone, with a length of 43m and a breadth of 7m. It leads water from the city and cross the wall into the river. The draining station has 15 outfalls which were distributed in three floors i.e. 5 outfalls per floor. Anyway, the drainage system of Lingzi city was the oldest and biggest one in ancient China by archeological discovery so far[7], and has also listed into China National Important Relic Protection Site.(Fig. 2)

Figure 2. The Draining station of Lingzi city (with permission of Xiao Yun Zheng).

In 221 BC，Qin Empery, the first unitive country on Chinese history was established in today's Centre China. Mr. Qin Shihuang，the emperor of Qin built the capital at Xianyang City (咸阳)，Shanxi province. Today, the old city had disappeared long time ago, but according to the historical documents, it was a very large city at that time, and archeological discovery in recent years found that consummated drainage facilities was built in the city. For example,

6 The Museum of Qi Kingdom Old City Site of Ling Zi District 1988.
7 Fan Chun Tai 1987.

archeological digging in the palace site found that a draining facility combined with 4 pools and earthen pipelines was built in the palace. This gathers the rain water and waste water from the palace by sewer to the pools, and made use of pipeline which directs the water into the rivers. However, the wisdom shown in this facility was that water can be stored in the pools for fire control firstly, and then leads into the river subsequently if too much water flows into the pool. It was also remarkable that earthen pipeline was popularly used as draining facility. Another important discovery in Shanjailing ruins of Qin dynasty, shangxi Province in 2010 was that the earthen pipe used as downcomer in the residential area where out of the major city. Some earthen pipelines were discovered including a pipe elbow. Hence, it is very rare to found such a type of earthenware (Fig 3, 4).[8]

Figure 3. The earthen pipeline discovered

Figure 4. The elbow of the earthen pipeline

8 Shanxi Provincial Relics Bureau,2010.

Found in 206 BC, Han Dynasty was a flourishing dynasty in the Chinese history. The founder of Han Dynasty founded its capital, Chang'an city (长安) near today's Xi'an city, Shanxi province. According to the historical documents, this city was developed to be a very large city quickly after it was founded and has existed as the capital city for 15 dynasties until 907 AC. Chang'an city was 35 km^2 in size at that time with a population of 500,000（Yang Kuan 1989）. According to the archeological discovery, a complex water system including drainage system was built in the city and it performs the functions of water supply, drainage, storage of water and ship transportation. The city was found at the south side of Wei Shui(渭水) River, but the water supply was from the Jue Shui (沣水) from the south of the city and it flows to the north into the town. Similarly, it also flows across the palaces and the city (this part called Ming Ditch, (9 km of length) then out of the town into Wei Shui River. The other branch of Jue Shui river also flows across parts of the town and then into the Wei Shui river. As a water system, series of hydraulic engineering were built to accomplish separate functions. For example, 10 large ponds were built for sluice, and the most famous one which still exists today is called Kunming Pond. This pond performs the functions of rainwater sluice in summer, water storage and supply in winter. Outside the town, a fosse (length of 26km) was built around the town, it was connected with the city river, Ming Ditch, and it also performs the function of sluice of rainwater from the town[9].

The water systems were connected to water supply rivers, ponds, drainage sluiceways, fosses and drainage rivers. However, rainwater and waste water which was gathered by underground sewers and channels from the palaces and resident places of the city was led into the main system, and later into Wei Shui river via Jue river which comprises of a perfect urban drainage system. What is important was that this water system also created a model of urban drainage system for the urban drainage designing in subsequent thousands of years in China, especially for major cities. Accordingly, a city usually built a rounding town fosse outside the town-wall, one or more canals across the city and some ponds which were constructed as the main structure of the water system. Finally, the building of subsystem of drainage with underground sewers, pipelines, channels, etc, in connecting main system from resident places of the city was also done. When the rainwater or waste water gathers, it will be directed into the main system via the subsystem, and stores in the ponds or the fosse. Outside the city, normally a canal will be built from a river to channel water into the city for water supply, and another channel will be built to connect the fosse and the river in the lower reach of the river for drainage. With this function, waste water is usually cleansed in the ponds and the fosse, and when the storm water comes, it can also be channeled into the ponds and the fosse, and later into the river. Therefore, flooding could be effectively stopped by this system and also with the act of storing water during the dry season. The archeological discovery also found that there are consummated sewer system which was built inside the city. For example, in 2008, a major brick sewer was found in the old Chang'an town. This sewer was 2m in width, and 40 m of length which was discovered (Figures 5 and 6).

9 Wu Qingzhou 2009.

Figure 5. The brick structured sewer of Han[10]

Figure 6. Part of the sewer of Han[11]

After Han Dynasty, there were a series of dynasties which have existed in the Chinese history and have established their capital in today's Xi'an (Han Dynasty, Tang Dynasty, etc), Kaifeng (Song Dynasty) and Beijing (Yuan, Ming, Qing Dynasties). The sizes of the cities were enlarged more and more as well as drainage system was also developed to perform the functions of the drainage of rainwater and waste water. Also, more and larger draining facilities were built in accordance with the urban population growth and construction; hence, the model of urban water system design almost all followed the structure from Han Dynasty, typically according to Chang'an city. Consequently, drainage techniques also advanced. The East Capital of North

10 Feng G 2008.
11 Feng G 2008.

Song Dynasty (960—1127), today's Kaifeng City was a paradigm of urban drainage development after the Han Dynasty. In this age, urban design and construction has been improved more effectively for water supply and drainage. Been built near Yellow River, Kaifeng city was around 50 Km^2 in size at that time, and there were four rivers: Bian river (汴河), Jingshui river (金水河), Cai river (蔡河) and Wuzhang river (五丈河) flowing cross the city performing the functions of water supply and drainage. At the early age of the city, flooding risk was of a strong concern due to seasonal water change and because the water was introduced into the city from Yellow River by Bian river directly as the main source of urban water supply. Nevertheless, this situation has brought about the design and construction of the city more conditionally for drainage. The water system of Kaifeng was consisted of (1) Rivers: It was mentioned above that there were four rivers flowing cross the city as well as series of city river connected to each other which serves as water supply and drainage. (2) Fosses: It was of great importance that there were three rings of fosse extending from the palace to the urban area. (3) The ponds: There were four ponds inside the city which were Ningxiang(凝祥), Qiongling(琼林), Jinming (金明) and Yujing (玉津) [12]. (4) The sewer system: It was documented that there was a complex sewer system built covering the urban area; some of them were underground channels while some were ditches along the streets. For instance, they were ditches built especially along the four royal streets. How the water system functions as drainage was that all the sections named above are connected to each other to regulate the flow of water seasonally. In winter and the non-rainy season, all the sections functions as water storage but correspondingly, it functions as drainage by receiving water from the fosses, ponds and draining the water by the sewers and rivers during the rainy season in summer. For example, the capacity of sluice of the three fosses was 17.65 millions m^3 and that of the four rivers were totaled around 18.52 millions m^3. Hence, it effectively reduced the flooding risk[13]. Anyway, in this age, the model of urban drainage has been developed to a matured stage likes Kaifeng city, and in subsequent centuries, the drainage design and construction of the city in China mostly followed this model.

China is an agricultural based country from its original history. However, drainage development not just in cities but also in rural areas has been an important part of water management for subsistence. In addition, many great drainage projects which were implemented from history have brought more possibilities for agriculture and urban development. Lake Tai Hu is a paradigm to better understanding the drainage in the rural areas.

Lake Tai Hu, having a size of 2213 km^2, is the fourth freshwater lake in China in the Basin of Yangtse River. Basically, it performs the function of water storage from Ynagtse River during summer; hence the lake country is the most important agricultural based area of China until nowadays. Started from the 6th century BC, a large people moved continually into the lake countries for farming purposes; thus, it has led to a rapid population growth and increscent requirement of farmlands. Therefore, more and more edge area of the lake were mounded for farming, and the local people got largely farmland, but the natural draining system was changed a lot at the same time especially in 12 century AC. Furthermore, mounding in the lake countries has become an immoderate situation, and the Drainage Rivers and canals of the lake were destroyed or choked by huge mounding engineering. However, this resulted to an increase in water and flooding in the farming area. From Song Dynasty, dredging the rivers and building new canals for drainage of the lake to Yangtse River was becoming to be a very important project for the governments until late of Qing Dynasty (late 19 century AC).

12 Deng Zhicheng 1982.
13 Wu Qing Zhou 2009.

Also, the local governments had to treat the lake frequently with great force at any period; hence the work was mainly focused on draining storm water from the lake and protecting the farmlands in the lake country[14]. It is a fact that Lake Tai Hu was one of the biggest rainwater draining engineering in China. Even though it was not very successful in the past periods, it had contributed immensely to local agriculture and urban security.

Drainage and the Urban Development

It has been a fact that many cities in China do not have a good water system in their early age. Once the local people built city near water, they might eventually suffer from flooding frequently. Therefore, as a result of this, the city's development would be limited due to incomplete drainage system simultaneously. Drainage has become a key factor in security and has fostered the development of the ancient cities. The governments and the rulers of the cities have to invest much money and labor to dredge the river or build draining facility ineluctably at various age of the city's history. Accordingly, it has also been a fact that many cities that existed and were developed in history were based on successful draining engineering.

Kunming City is the capital of Yunnan Province being located at southwest China. It is a paradigm that a city was developed from a small town to be a major city by successful draining engineering from its history. Basically, the water situation of Kunming city was not good. The landform of Kunming is a narrow area between the north bank of Lake Dian Chi[15] and the mountains, and there is only one major river from the north mountain which flows cross the city as the mainly water supply resources. As a result, the water draining from the mountains to the lake mainly depends on this river. It has brought frequent flooding to the city. Also, an increase in the water level of the lake has brought about flooding in the lake country during summer. Therefore, the water governance in the history of Kunming city was mainly focused on two key projects: one is Song Hua Ba Dam which was built at the middle reach of Pang Long Jaing river which performs the function of flood control. Another one is Hai Kou He river dredging engineering that controls the drainage of Lake Dian Chi. After Song Hua Ba dam was built and more water were channeled into the lake, the water level in the lake increased during the rainy season. Thus, this brought about flooding to the lake country, especially the north bank which was very close to the city. For declining of the water level in rainy season, how to drain water from the lake has become a new challenge for the local governments. However, the main way to solve this problem was to have better drainages from the lake to the Yangtze River upper basin by Hai Kou river. The earliest event to governing Hai Kou river was recorded by the document in 1273, Yuan Dynasty. According to the document, Mr. Zhang Li Dao, the agricultural administrator of provincial government forced 2000 labors to dredging and extending Hai Kou river. After that, the river was dredged more deeply and broadly; hence the accumulated soil in the river was moved and a new riverbank was built which made Hai Kou river to be a river 20 m broad with a length of 10 km after 3 years. Through this project, drainage of the river was effectively improved, and the water level of the lake declined from 1890 m(a.s.l) to 1888.5 m. Also, the size of the Lake was diminished to 410 km^2 from 510 km^2 during the 12th century. In addition, thousands hectares of farmland were formed as a result of the declined water level. In 1501~1502, the governor organized a major project to dredge the river way again. However, they built some new channels for the rising of drainage, and

14 Tain Xi Ming 2005.

15 Dian Chi lake is biggest fresh lake in Yunnan province and sixth fresh lake of size in China, 306.3 km2 of size today.

15 mounds were built to stop flood along the riverbank. After this project was completed, the water level of the lake declined to 1888m and the size of the lake was diminished to 350 km^2. Also, thousands of hectares of lands emerged again by the water decline, and this change was effectively supported by the rapidly growing population and agricultural development in Kunming area; and finally, it has become a major city in China (Fig.7). Accordingly, Kunming city was developed by successful water management especially by the drainage constructed in the history of Kunming city[16].

Figure 7. The lake life in early 1940s (with permission of Xiao Yun Zheng).

Conclusion and discussion

China started the history of drainage from its early age especially at the age of early urban formation, and then it was developed with the rural and urban development. The ancient founders of cities always choose the riverside as the site for building their cities for convenient water supply. However, it is easy to be understood normally in the world history that early civilizations almost emerged from the riversides. Hence, what we learnt from the wisdom of the Chinese ancestor in designing a city was that they did not just build the city close rivers but also designed and built the city with drainage system. Hereafter, it was developed to be an integrated water system with the functions of water supply, use and drainage. Normally, the water system was combined with river, city rivers, draining aqueducts, ponds, town- rounding fosse, draining rivers, etc. Thus, this system had performed the functions of water supply, use and drainage of a city thereby working as a water cycle system.

16 Xiao Yun Zheng 2013.

The systematic water system design and construction in the history of the urban development has been remarkable. The water system of the urban history not only focused on water supply and other single purpose, but it also considered it as a systematic design and construction which included water supply, use and drainage which are the constituents of a water cycling system. Accordingly, the systematic idea and construction of water system was the essential factor of the ancient urban construction in China that has enhanced all ancient major cities' development from their early age even till nowadays to thousands of years.

The strategic design and construction of drainage system is also the outstanding feature of the ancient urban construction. For example, city rivers, sewers, ponds and town- rounding fosses were built and linked to the urban water system serving as the function of water circulation and especially that of drainage. Today, there are many historical draining structures which are still functioning in many cities. The meaning of "strategic design" is that people not only designed the urban water system systematically for multi-purpose use but was also strongly considered to encounter possible flood after a longtime. With the case of the storm flooding in Beijing in July 21, 2011, the storm mainly hit the area of West No.3 Rounding-town Express Way and West No.4 Rounding-town Express Way. Nevertheless, the area of the old town where located inside No.2 Rounding-town Express Way with the ancient draining structures which was not heavy affected. The drainage system in this area was built in Ming Dynasty and has been used for more than 500 years. So far, the drainage system in the area which was heavily hit in July 21, 2011 was built just about 20 years ago. The outstanding paradigm is the royal palace and the Forbidden City. However, there were no hit by this storm event and many old structures nearby were also in same condition. What was more outstanding was that there were no records of storm flooding regarding the historical structures in the past 600 years. However, it is strongly relying on the consummate drainage system incorporated together with the palace construction. (Fig 8, 9)

Figure 8. The draining river inside the Forbidden City (with permission of Xiao Yun Zheng).

Figure 9. The Draining outlet which was built likes dragon head (with permission of Xiao Yun Zheng).

China has been involved in rapid urbanization in recent decades; consequently, all the cities have gone in a quick enlarging process. Compared to the difference of the drainage in the old time and current age, the focus in ancient time was mainly on storm flood draining and not the waste water due to limited population and simple livelihood at that time. However, there were no special concern for waste water, but the situation in this current age is mainly focused on waste water, and rainstorm is even been neglected in many cities. It is a common status that many cities have planned the reconstruction of waste water disposal facility but rainstorm disposal is not included at same time. Today, the situation of the cities in China is quite different from that of old times; therefore, it is difficult to expect the old drainage facilities to perform all functions including rainstorm disposal. But even so, it is still valuable to learn from history by having a systematic and strategic design and reconstruction of the water system in the enlarging urban construction. Also, it is very important to put water supply, waste water disposal and rainstorm treatment on a coequal basis.

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Petri S. Juuti

Water fountains in Tampere, Finland

Background of Fountains and industrial heritage of Tampere

Finland is quite unique in Europe as to its water resources. The country has some 56 000 lakes with a minimum area of one hectare and all together circa 200.000 lakes. Ground water occurs in alluvial eskers formed during ice ages, the last of which ended some 10 000 years ago. Areas lower than 50–60 metres above sea level have problems with water quality due to geological reasons. In such areas bigger cities use surface water for their water supply or acquire their raw water from sources further away. Nowadays some 60 per cent of the people use natural ground water or artificial recharge.

A traditional fountain (Latin fons) refers to a system where water is drawn from a source, fills a basin of some kind, and is drained away. Fountains may be free-standing or connected to walls of buildings. In fountains sheet of water may flow over various types of surfaces: stone, concrete or metal. Basins may overflow from one to another, or the overflow may imitate a natural cascade. Fountains can be located in small, artificial, ornamental ponds, basins or formal garden pools, and often they include sculpture. By modern pumping and pressure water can be forced into the air through a jet or multiple jets. Light can be also added for additional decorations. In the early phases fountains were used especially for public water supply purposes. The first evidence of water supply network emerged with cities of first ancient civilizations (Egypt, Sumerian and other civilizations in Middle East, Indus River, China). Ancient civilizations of the New World (e.g. Maya, Aztec, Inca) also developed sophisticated water systems, fountains being an important part of them. The Romans organized centralized system of aqueducts and collection of used water while they also used various types of small systems such as wells and fountains. Their original purpose may have been to supply water to communities, but quite soon they have also been assigned other functions related to cityscape. Fountains have also been used to cool cities during hot spells.

In the early days of the modern public water systems in the 19th and even 20th centuries Europe, water from fountains was also put to practical and partly for economic and productive uses, such as drinking water for animals, as in Tampere. Fountains often have symbolic meanings or otherwise become the symbol of a city or location.

Among the traditional and earliest uses of fountains were fire fighting, especially if high-pressure pumped water was not yet available, like in Tampere, and storage of water.

Tampere, currently Finland's third biggest city and the largest inland city in the Nordic countries with a population of just over 200 000, was founded in 1779. For long, Tampere used to be the centre of Finnish industry which is also reflected in its nickname "Manse" which derives from Manchester, the traditional English industrial centre. Many industries and factories established in Tampere from the 1830s to the 1950s were among the first of their type in Finland.

The history and development of Tampere have been largely shaped by issues related to water and water management. The city was established along the rapids that cut their way through a glacio-fluvial esker between two large lakes some 7,500 years ago. The availability of water power and lakes suitable for waterborne transport made the Tammerkoski Rapids and its banks a favourable location for a growing town.[1] This chapter describes how water influenced the growth of the city on the basis of four major water fountains related to the industrial heritage of Tampere.

The Central Square Fountain

The first municipal "water pumping system" in Tampere was built in 1835. It had a German-made iron pump upstream of Tammerkoski Rapids which pumped water through a wooden pipe to a well in the market square. The system was a failure, but it was only after the Fire of 1865 that the piped-water issue was taken up again.The industrialist Wilhelm von Nottbeck suggested to the City Board that a privately owned waterworks be constructed for the city. Von Nottbeck was the owner of the biggest industrial enterprise in Tampere, the Finlayson Mill. Since the proposed privately owned waterworks would have meant a quite big financial risk to the city, the Board rejected the proposal and decided that the city would build its own water pipe.[2]

Subsequently, the city sought expert knowledge and contractors from the private sector, such as Mr. Malakias Pasi in 1874. The next year the City Board decided "to submit the piped-water issue to a committee for examination". This meant the start of a new era in the history of water supply in Tampere: ever since all related plans and projects have been initiated by the city. In 1882 the city water works of Tampere were established in which connection the industrialist von Nottbeck donated the fountain in the Central Square (Fig. 1). It was the harbinger of a new era – an era of water in many senses.[3]

The fountain was donated particularly to the women of the town to provide them with household water. The cast iron fountain was made in Potsdam, German Empire. Under Wilhelm von Nottbeck, the Finlayson Cotton Mill grew into Finland's first large-scale industrial enterprise. The fountain was the end point of the water pipe. It was also a place where water could be drawn freely for household use and animals could be watered. The fountain stands in the Central Square, right in front of the old City Hall of Tampere, currently the major venue for the city's PR events.

The fountain has been in operation since 1882 except for periods of restoration. In 2004 a 4.5 metre high dome-type cover of a special type of glass was built to protect the fountain, which represents the city's cultural heritage, in winter. The cover is normally removed in April or May and put back in place in October. The cover was manufactured by Tambest Ltd and designed by the architect Juha Ryösä. The high-tech glass structure is made of 6 mm safety glass laminated to 6 mm Pilkington self-cleaning glass. The lower and upper parts of the dome have sand-blasted decorations designed by Sauli Iso-Lähteenmäki. The dome is illuminated during dark winter evenings and nights.[4]

1 Katko & Juuti 2007.
2 Juuti & Katko 1999.
3 Tampere City Records Office, Minutes of City Administrative Court as of 28.9.1874; Juuti 2001; Juuti & Katko 1999.
4 www.pilkington.com/Applications/Case+Studies/finland/nottbeck+fountain.htm.

Figure 1. Central Square Fountain that has operated since 1882 in front of the City Hall of Tampere (Photo: P. Juuti).

The Fountain in Wilhelm von Nottbeck Park

The second and third fountains described in this chapter are also related to the industrialist Wilhelm von Nottbeck. In 1995 the park around the Finlayson Palace came into the city's possession and was renamed the Wilhelm von Nottbeck Park. In 1820 – some 175 years earlier – a Crown distillery and gardens were situated there.

The original park was created in the 1840s while Wilhelm von Nottbeck was the owner of the Finlayson Mill. The park was designed in the English style with flower beds, curved walks, three islands with connecting bridges and fivegazebos. The channels between the islands were filled between 1922–1923, which altered the shoreline and the shape of the entire park. No plan or map of the original park has been found, but it is likely that the park was created by skilled master gardeners.

During the time the von Nottbeck family lived in the palatial house, the park had four large greenhouses where seeds and bulbs were brought to bloom. Many kinds of fruit were also grown in the greenhouses, such as watermelons, pears and peaches. Grapes and pineapples were grown in separate greenhouses, and the grape crop, in particular, was very large. The greenhouses were dismantled in 1978 to make way for a parking area – a new priority. In 1899 the old wooden main building was replaced by a new palace in the neo-Renaissance style,

designed by the City Architect Lambert Petterson. Today the renovated palace functions as a high-quality restaurant.

The bronze statue of an eagle on the Kotkankallio rock is regarded as the oldest structure in the park. One wooden gazebo, called the Chinese Parasol, remains in the northwestern corner of the park.The palace is fronted by a bronze fountain displaying a swan and a boy. Another fountain, with a lion theme, is located north of the main building. (Fig 2 and 3). The meaning of these fountains are joy. They are meant for esthetic experience. They are also facing entrances of the Palace, hence pointing out the entrances.

The Fountains of Hämeenpuisto Boulevard Park

Figure 2. Fountain Child and Swan next to Finlayson Palace (Photo: P. Juuti)

Figure 3. Lions fountain next to Finlayson Palace (Photo: P. Juuti)

Our forth fountain stands in what today constitutes the western part of the city, west of the north-south Tammerkoski rapids. The kilometre-long Hämeenpuisto Boulevard Park was built in 1909 in the north-south direction. Its original purpose was to act as a firewall between the two sections of the city, since all houses were wooden at that time and even much later. The park has numerous benches, where strollers can take a breather and just watch people pass by.

Big fountains stand at both ends of the Boulevard. The Näsi Park at the northern end was created in the early 20th century on almost bare rock using earth dredged from the nearby harbour. The park was planned by the City Gardener Onni Karsten. Only spindly pines and junipers used to grow on the rock, but now the park boasts hundreds of trees and some 500 perennials, including rare imported species. The total area of the park is about six hectares. The fountain at the northern end is the first public work of art in Tampere, dating from 1913. It was designed in the national romantic style by Emil Wikström and donated by the wealthy merchant, Nikolai Tirkkonen. (Fig 4)

The fountain comprises three statues. One depicts the maiden Pohjanneito spinning gold thread, while the other two statues on a lower level symbolise the cycle of life in the form of a grandfather and his grandson standing by a water wheel and the grandmother teaching her granddaughter how toweave. Thus they reflect the industrial heritage of the city. In October 2008 specially designed lights were installed in the fountain to illuminate it.

At the other end of Hämeenpuisto Boulevard we find the South Park, created in twophases between 1915–1917 and 1928–1929. It was designed by City Engineer K. Vaaramäki, and its construction was led by City Gardener Onni Karsten. As late as 1897 Russian soldiers had

Figure 4. Tirkkonen fountain (Photo: P. Juuti)

vegetable gardens and root cellars in the park, the reason being that Finland was a Grand Dutchy of Russia at that time. In 1918, during the civil war fought after Finland gained her independence in 1917, potatoes and swedes were also grown there.

In the 1920s the South Park had a classical-style stage with roses growing around it. Today a granite monument and fountain honouring the co-operative movement, sculpted by Wäinö Aaltonen in 1950, stand in its place. The two big fountains at the northern and southern ends of the Boulevard Park represent two different ideologies –- once so far apart, but now co-existing in harmony. (Fig 5) There is also a fairly recently erected fountain consisting of a granite ball rotating on a layer of water in the middle of the Boulevard Park, next to the city main library called Metso (capercaillie in English). It also receives a glass cover for winter. (Fig 6)

The Emil Aaltonen Fountain

The fourth fountain is the Emil Aaltonen multi-tier fountain of Figure IV.0. It was designed by Raimo Utriainen (1927–1994) and completed in 1969. This stainless steel fountain was officially inaugurated on the 100th anniversary of industrialist Emil Aaltonen's birth on 29.8.1969. That famous shoemaker and industrialist (1869–1949) owned the biggest shoe factory in the Nordic Countries. The fountain symbolises the dynamic development of industry.[5] Aaltonen left his fortune to the Emil Aaltonen foundation, currently one of the major private foundations supporting creative scientific research in Finland. (Fig 7)

Concluding remarks

Water fountains are probably at their best when they represent and reflect local city culture and heritage like the described fountains in Tampere. They are all closely connected to local industrial heritage and traditions – even their designs reflect historical linkages in many ways. They are not only beautiful and impressive, but also tell a story. The more recent illumination of the fountains has only added to their beauty and appeal.

The industrial heritage of Tampere is reflected by water in many ways. As the final touches are being put on this book, the city is preparing a proposal for the Tammerkoski Rapids flowing through the city centre, and the old factories along its banks, to be placed on the UNESCO World Heritage List.[6]

Even in a four-season climate, winter does not have to prevent the operation of water fountains the year round. After all, greenhouses operated in Tampere throughout the year already about 150 years ago. Water fountains, especially those in the public spaces of the city, reflect different aspects of the industrial heritage and, indirectly, its other cultural traditions and evolution.

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Figure 5. The co-operative fountain (Photo: P. Juuti)

Figure 6. Modern fountain next to the library (Photo: P. Juuti)

Figure 7. The Emil Aaltonen Fountain (Photo: P. Juuti)

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Importance and Challenges of Sharing Experiences among an International and Interdisciplinary Group of Doctoral Students

Introduction

Water is an element which joins people across municipalities, nations as well as disciplines. The most challenging water related problems of our world require international and interdisciplinary collaboration. However, the Nordic and Baltic countries, have several small research teams oriented towards water services management and governance, but unfortunately they are scattered and cooperation between them is rather limited. In order to enhance cooperation, an international group of researchers established a network called Viable Water Management and Governance for the Futures (VIWAFU). The network is based on the idea that all partners would benefit from collaboration between the research teams. Within the VIWAFU network experiences and knowledge could be shared and researchers gain different perspectives and promote comparative thinking.

During the years 2012–2014, the network organized several meetings, seminars, field visits and altogether four research training courses involving PhD students and postdocs, as well as some MSc students. The courses were supported by professors and lecturers. Each of the four host universities contributed to the course series with an emphasis on a topic relevant to the local area. The courses included a wide range of issues: from water management and policy to technical solutions for specific fields.

The very first and introductory research training course took place in Lund University, Sweden in June 2012. It aimed to improve understanding of water services management, policy and governance. The second course was hosted by University of Latvia in Riga in May 2013, where participants concentrated on the drinking water, its sources, and water supply infrastructure. The third part, hosted by Technical University of Denmark, Copenhagen in August 2013, focused on municipalities as platforms for innovative water strategies, as well as sustainable techno-social transition with emphasis on storm water. The final course, which were hosted by Kaunas University of Technology in June 2014, dealt with viable water management in tourist areas in Palanga, Lithuania, considering the challenge in accessing potable water and disposal of wastewater during the tourist season.

Drawing on the experiences gained from these courses, participants decided to communicate the major lessons learned from international and interdisciplinary collaboration in the early stages of their researcher's career. Overall, course participants got very good ideas from each other and they decided to continue fruitful cooperation also in future.

On the crossroad of different cultures

The first challenge in working in an international group of students with different research background is communication. Despite of great knowledge on the subject, the challenge is to make oneself understandable to the others, while the ways of communication may be very different between cultures as well as research fields. The challenge became visible among the student coming from Nordic and Baltic countries as well as from China, India, Kenya, Pakistan, Kazakhstan, Italy, Iran, and Check Republic. The course series gave an opportunity for practicing: each course gave flourishing inter-cultural communication. In particular, the Palanga course concentrated on interaction training.

Figures 1a and 1b. Hard work at the discussion table (left: Palanga, photographer Erika Elijosiute, right: Copenhagen, photographer Johanna Sörensen).

One of the communication challenges is to simplify the message. Sharing experiences offers an opportunity to see and discuss the same issue from different viewpoints. However, the variety of experiences is based on cultural differences, variety of research fields and the development level of participants. Hereby, the challenge of expressing oneself arises. Through a simple task, the participants of Palanga course understood that to present their scientific work in short is not as easy as could be expected. It is a great challenge to present the research results without losing the main point along the way, especially when the listeners comes from a wide range of cultural backgrounds.

In terms of development of water services in different countries, an important question was raised during the course series: What should developing countries do with their water management system? Should they find their own way forward or should they use the experiences from other countries? Is it really the best solution to walk the same way, or can developing countries find an even better track to follow? After long and stormy open table discussions, the questions were still left open and it became clear that there are no easy answers to them.

Almost all courses included pre-assignments related to the course theme and the students' home countries. Accordingly, every country had a chance to show and discuss their own

problems or achievement in the water sector. In this way, the pre-assignments gave valuable facts as input to discussions during the courses. In addition, during the course in Copenhagen, scientific articles on the topic were read and discussed. The students were grouped together to discuss the articles that were of most interest to each of them. These sessions, together with study visits, lectures and the other pre-assignments, further enriched the learning process for the students. Altogether, this was a great opportunity to learn differences and similarities in the challenges and progresses made in water-related issues as experienced in the various countries and cultures that were represented.

Beside all hard work done in classrooms, the participants got chance to see the cultural part of each country. The courses offered interesting excursions and some local degustation. Together we concluded that free-time and additional programs during the courses was an important part of group formation and getting to know each other better.

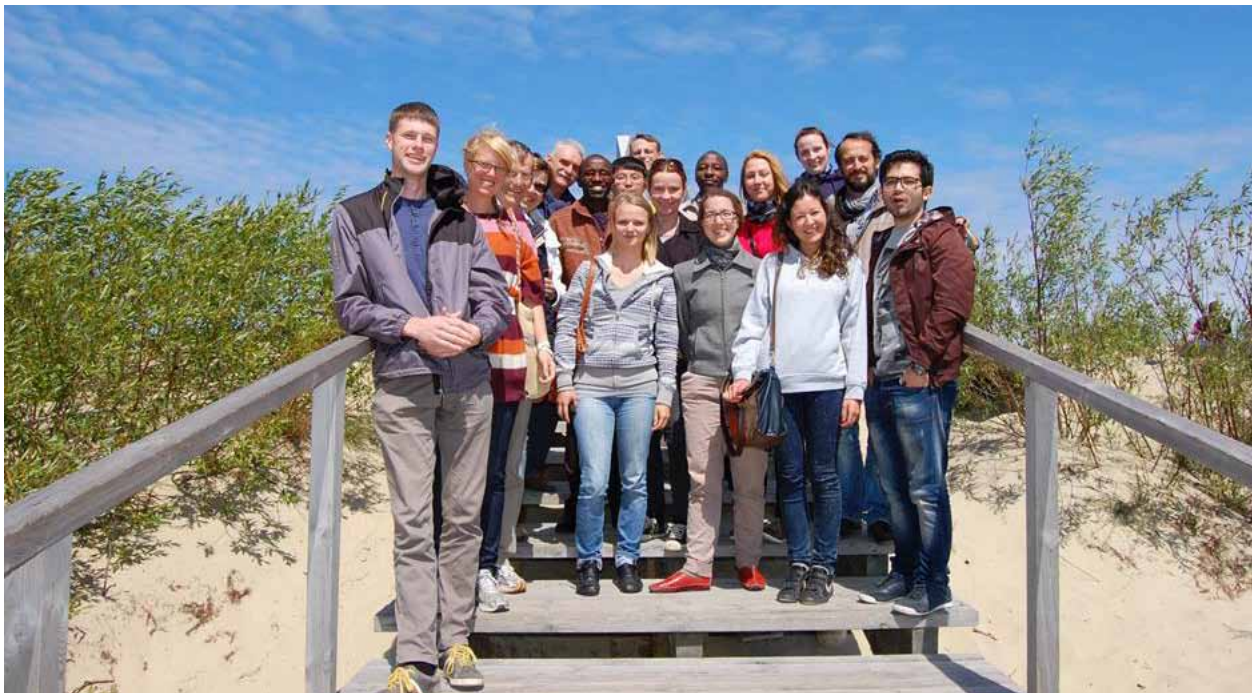

Figure 2. VIWAFU students and teachers on the sightseeing of dunes in Neringa, Lithuania (Photographer: unknown tourist at the beach).

Water as lubricator for collaboration

The students came from diverse fields of disciplines including water engineering, water governance, water history, water safety, water law, environmental science, geology, modelling, etc. In the end, this proved to be a fruitful mix for sharing experiences and knowledge, where everyone was viewing the water issues from different perspectives. Furthermore, interdisciplinary discussions gives a deeper understanding of a certain issue, thus improving projects conducted in research themes with researchers from diverse fields. However, interdisciplinarity also raises significant challenges. For example, it is known that engineers might have difficulties with management issues, or that water managers have problems to fully understand geological topics, technological solutions or the relevance of water history, and so on. During several field visits, this caused confusion for the guides at the sites: there were many different questions from various fields varying from engineering to political, from geological to sustainability studies, from law to economical. Hereby, we return to the challenges on communication.

Figure 3. Daugava water before and after treatment at Riga's drinking water treatment complex (Photographer Ruta Sidaraviciute)

Communication between various disciplines is an important issue in the world of research. These skills are needed in conferences, during a research exchange, and in practical projects, as well as in a coffee room of one's own department. During the course series, the interdisciplinary group had occasional problems in absorbing information about the specific topic that was never or very briefly analyzed before. Herein, we may note that researchers do need to know how to popularize their studies also among the academics. Thus, in addition to disseminating the results for wider public or research funders, the communication in an interdisciplinary group of researchers requires similar skills. Fortunately, communication skills are gained in practicing.

Every student got some practical or theoretical benefits as well as new perspectives from this course series: governance and management oriented students obtained some knowledge about practical matters, whereas engineers gained skills in discussion and governance. Furthermore, some of the students had a possibility to train their communication skills in practice with a journalist. A big international and interdisciplinary group got attention during the visit at Roskilde site visit where the local newspaper decided to have an interview with some teacher as well as some students.[1]

Concluding remarks

One of the main goal of the VIWAFU network was to bring together doctoral students with similar interest and to create a strong network. It is not too brave to say that the courses indeed created an international and interdisciplinary network of students. The students have continued to communicate through social networks, emails, and open online sites after the course series.

1 http://sn.dk/modules/fsArticle/index.php?articleid=349059.

Figure 4. VIWAFU students and teachers at "Klaipedos nafta" treatment plant (Photographer: guide at the treatment plant)

This network will indeed be valuable in the future activities such as common applications, consultancy, education, and for sharing information in the field of research. If well-prepared, such a course series gives a great opportunity for PhD students and early year researchers to broaden both their knowledge and their network.

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Vuokko Kurki is a PhD student at the Tampere University of Technology, Faculty of Natural Sciences, Finland. Her research interests are groundwater management, environmental conflicts and collaborative water governance.

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Ruta Sidaraviciute is a PhD student at the Kaunas University of Technology, Department of Environmental Engineering. Her research area is indoor air quality management. She got familiar with the VIWAFU project through her professor who was fascinated about water and its' treatment. Nevertheless her emphasis on air quality issues, these courses gave her great benefits.

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Johanna Sörensen is a PhD student at the Lund University, Department of Water Resources Engineering. Her study is about urban flooding and how to change the cities green and resilient in the future. As climate changes and the cities grow, another stormwater management is needed that can protect us from flooding and in the same time make the cities more liveable.

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Samuel Ngari Kibocha is a Senior Lecturer in the Department of Civil and Construction Engineering at the University of Nairobi, Kenya. His areas of specialization are rural and urban water supply and irrigation systems, environment and wastewater engineering. He is also a part-time doctoral student at Tampere University of Technology currently carrying out research study entitled Role of Water Cooperatives in Kenya.

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Viable Water Management and Governance for the Futures (VIWAFU) – network had meating also at the Tampere University of Technology in August 2014. (Juuti)

Samuel Kibocha Ngari and Geoffrey Ikobe

Report on North South South Exchange Program 2014 in Finland

We were privileged to be part of the for the North South South (NSS) student exchange program. We were selected for the three-month program starting from June 2nd to the end of August 2014.

During the program, we were privileged to be hosted at the Department of Chemistry and Bioengineering offices of Tampere University of Technology (TUT), known as Tampere Teknillinen Yliopisto (TTY) in Finnish language. The university is Finland's second-largest university in engineering sciences and is located in Hervanta, a suburb of Tampere. The main course studied during the program was the Water and Society Program, which.

During the program we were engaged in the course on Water and society (WASO) Virtual Course on Sustainable water supply in Long-Term Perspectives (WASO) which was the main course of study. This was an online program, hosted by the sister University of Tampere (UTA). It was divided into six one-week sections. Each of the six sections had some assignments for all students and each new section started on Monday morning. In addition to the weekly assignments, everybody had to write an essay (8-12 pages) on a selected subject from a given list. Our teachers were Petri Juuti and who was the course leader, Riikka Rajala and Johann Tempelhoff.

The Finnish Cultural Foundation financed the course. This course was made possible with funding from Academy of Finland, project Water as Social and Cultural Space: Changing Values and Representations (no.263417), with NSS funding from CIMO (Centre for International Mobility) (UWAS project), and with funding from UNIPID. The program financed all my transport and accommodation. The program is aimed at promoting human capacity in all participating countries through interaction and mobility.

Each week had a different theme that looked at different aspects of water. The goal was to learn about and get an understanding of the role of WSS in the development of societies. In the course, we looked at the history of WSS systems in different cultures in the pasts and presents, contemplated on WSS in interdisciplinary ways and across boundary lines. We were also took note of WSS in developing and developed societies where we concentrated mainly on urban societies and WSS. We further looked at the essence of water in selected religions, various selected cultures, the philosophy of water including superstition on water. We studied the role of WSS in ancient cultures such as the romans with case studies in Finland and South Africa and the miasma theory and WSS in the contemporary urbanization cases.

Different sources of water were looked into including the sanitation aspect and the waste disposal methods. Finally, we also studied about cultures that have lived in harsh climatic conditions especially in Africa coupled with their water-related history.

We were able to attend a the Viable Water Management and Governance for Futures (VIWAFU) Research Training Course arranged in Lithuania in Palanga by the Kaunas University of Technology and the partnering Tampere University of Technology (TUT)as from the 15th to the 20th of June. The Training Course (RTC) for MSc and Doctoral students was

Geoffrey Ikobe, Professor Ezekiel Nyangeri (University of Nairobi, Kenya) and Samuel Kibocha Ngari in front of the water tower in Hervanta, Tampere, Finland in August 2014. (Juuti).

entitled "The tricky task of Viable Water Management in Tourist Areas". The overall theme was water but understood very widely.

We were also privileged to visit the Artificial Ground Water Recharge process in Turku run by the Turku Region Water Ltd. This was a revelation into the ground water sources of water that could be applied also in my country Kenya. In the process, we also visited the Pyhäjärvi Institute in the Eura municipality where we learnt about the environmental management processes in Lake Pyhäjärvi that even support food production. We further visited Biolan Oy which manufactures and sells products for ecological farming and green area management as well as environmental products since the 1970's. We saw composters and dry toilets among other inventions and were happy to learn that the company also undertake their own research on dry toilets, an aspect that could be of much use to Kenya, which has challenges with wastewater management and sanitation.

We were invited to attend the third UNECWAS Seminar on "Water Services in Development and Society" held on Thursday, 21st August 2014 at TUT. There we participated in the presentations and listened to experts and academics in the WSS sector from various countries worldwide.

Finally, we managed to get to visit the Rusko Water treatment works where we saw and learnt a number of things about the water treatment processes especially the Dissolved Air Technology (DAF).

The WASO course ended at 23.59 on (Sunday 24th of August). The course helped us learn how to work on the internet-based studies and relate to other students online within the course.

We were privileged to know the host lecturers Petri Juuti, Riikka Rajala and Tapio Katko among others who were ever ready to assist and went way beyond being good hosts and became friends. The warm atmosphere in the universities was a great learning lesson in itself and made us feel at home. It was a privilege to be in one of the leading universities in the Nordic countries.

The course was not only advantageous to us academically but also socially. We managed to make several international acquaintances during the period we spent there that would otherwise hardly have been possible. We are grateful for the opportunity to learn all that we learnt including making new friends and the opportunity to interact with students and lecturers from other cultures other than mine.

We are deeply appreciative of the opportunity availed to us by both my home University of Nairobi, the Finnish universities and government and all that were involved to make it a success. Our stay here was an eye-opener to several other good lessons and experiences that would not have been possible without physically coming to Finland. More of such courses should be availed to even more students in future as much as is possible. This is part of the help that can be given to the developing countries so the students there so they can gain a vision for development of their countries like we have. We look forward for another opportunity to come back again for further studies if possible.

Authors

Samuel Kibocha Ngari is a Senior Lecturer in the Department of Civil and Construction Engineering at the University of Nairobi. His areas of specialization are rural and urban water supply and irrigation systems, environment and wastewater engineering. He is also a Member of the Institution of Engineers of Kenya, a Registered Engineer and a Lead Expert of the National Environmental Management Authority of Kenya.

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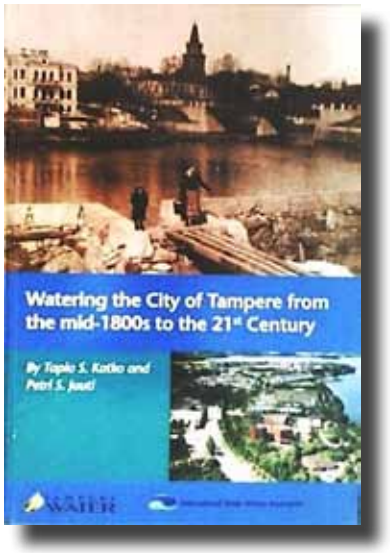
Geoffrey Ikobe

Book Review:

Watering the City of Tampere from the mid-1800s to the 21st Century



Tapio S. Katko and Petri S. Juuti investigate the historical struggle of Tampere city to achieve clean and adequate water in the hope of providing an efficient and healthy sanitation for the residents of Tampere and its environments. This book is definitely a stimulating read not only to students of water, environment and history but also to practitioners and beneficiaries of these related services.

Finland's Water Supply and Sanitation (WSS) systems are significant to not only the Finnish people but all that are interested and are affected by this important subject. The presentation in this book is not only important for water supply and sanitation for Tampere residents but also for other cities and countries and not least for the academia.

This is a book that covers the themes of WSS in Tampere from the initial development through the changes on politics and technology up to the recent. It also provides a glimpse into the future of WSS in Tampere city, the third largest city in Finland and the largest inland city in the Nordic countries.

As one may notice, authors go on to show how the development of the WSS in Tampere has in the past been strongly influenced by its managements and that the water issues have strongly shaped the city's development too.

Right from the pumping systems that were started in the 1830s and the sewer systems that came into place in the 1880' the authors lead the reader through the panorama of the 1st pipes sewerage system, the effect of the sewers on the receiving water bodies and the resulting backlash which forced improvements that set the stage for the modern highly advanced sewage treatment in Tampere.

The book highlights the rich historical tapestry of factors affecting the WSS of this pace-setting city also called Pirkanmaa as people migrate into it in the 1960s due to social changes forcing a change in its planning that saw the development of satellite towns such as Hervanta. It also shows the reader how the social and industrial changes of the times have influenced the history and development of the WSS systems of management of the city.

The development of its firefighting system occasioned by destructive flames in the 1850s highlights the need to quickly learn from others' predicaments and to institute necessary actions. The book also shows city's success in helping to develop other distant towns' water supply systems. The development of rural water supplies started in the 1872 with Ostrobothnia. We are also led through the misjudgments of the city's WSS leaders as they tried to save on the

cost of pipes as they released untreated water into the receiving water bodies and led to the typhus epidemic of 1908 and 1915

The authors inform us about the early exploration of ground water supply as an alternative to surface water in the 1920s which was not followed up but came late in the 1950s and now 30% of Tampere water is from ground water sources.

The development of water storage structures and towers is presented along with the spectacular ''Tricholoma Virgatum" mushroom tower of Hervanta built in 1982.

The book shows the reader how previous beliefs and economics have influenced the Tampere's WSS such as when its water men believed that he Tammerkoski rapids would themselves cleanse the dirty water that was fed into it. The use of the slop bucket was slowly replaced with proper sewerage systems especially in the urban areas. The book then leads the reader down through the further development of water treatment by chlorination at Lake Nasijarvi and Kaupinoja and the outstanding "DAF" treatment technique implemented in 2000.

Tampere Water's Waste water discharge is presents as way above the required European EPA rules for Waste water discharge and this water operator makes use of waste products such as methane to produce heat and electricity run the city's treatment works facility. It is a model of innovation and of "making lemonade out of lime".

Herein one is shown how man can change his environment from bad to good through cooperation and determination as in the case of the terribly polluted nearby lakes that were quickly restored to become safe waters. Tampere Water now serves over 200,000 people with water supply and 250,000 with sewage treatment and has over 1,200km of pipeline.

The book is well written and edited with good photos, interesting anecdotes and witticisms Interspersed within it that make it fun to read. It is small enough to quickly go through and finish yet detailed enough to handle its theme. This is a must read for anyone interested in the history of water and sanitation in urban settings and for anyone wanting to know more about Tampere City's water history. It is a compact and concise book on the Tampere City's history of water and sanitation.

Author

Geoffrey Ikobe Geoffrey is a master's student of Water and Engineering and has a bachelor's degree in Civil Engineering from the University of Nairobi, Kenya. He is a registered engineer with the Engineer's Board of Kenya with varied experience as a water engineer. The views expressed here are the authors own.

Dr Juuti, Professor Myllyntaus, Viktor Pál, Professor Haapala

NEWS

Doctoral dissertation

the 28 th of February 2015

University of Tampere, International Environmental History Group (IEHG)

MA Viktor Pál defended his doctoral thesis:

Crave for Growth.

An Environmental History of Water in the Borsod Basin, Hungary, 1945-1980.

Kasvun nälkä. Veden ympäristöpolitiikan historia Borsodin aluella Unkarissa, 1945-1980.

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Supervising Professor Professor Pertti Haapala, University of Tampere, Finland
Thesis Advisor Dr Petri Juuti, University of Tampere, Finland
Opponent Professor Timo Myllyntaus, University of Turku, Finland

Viktor Pál

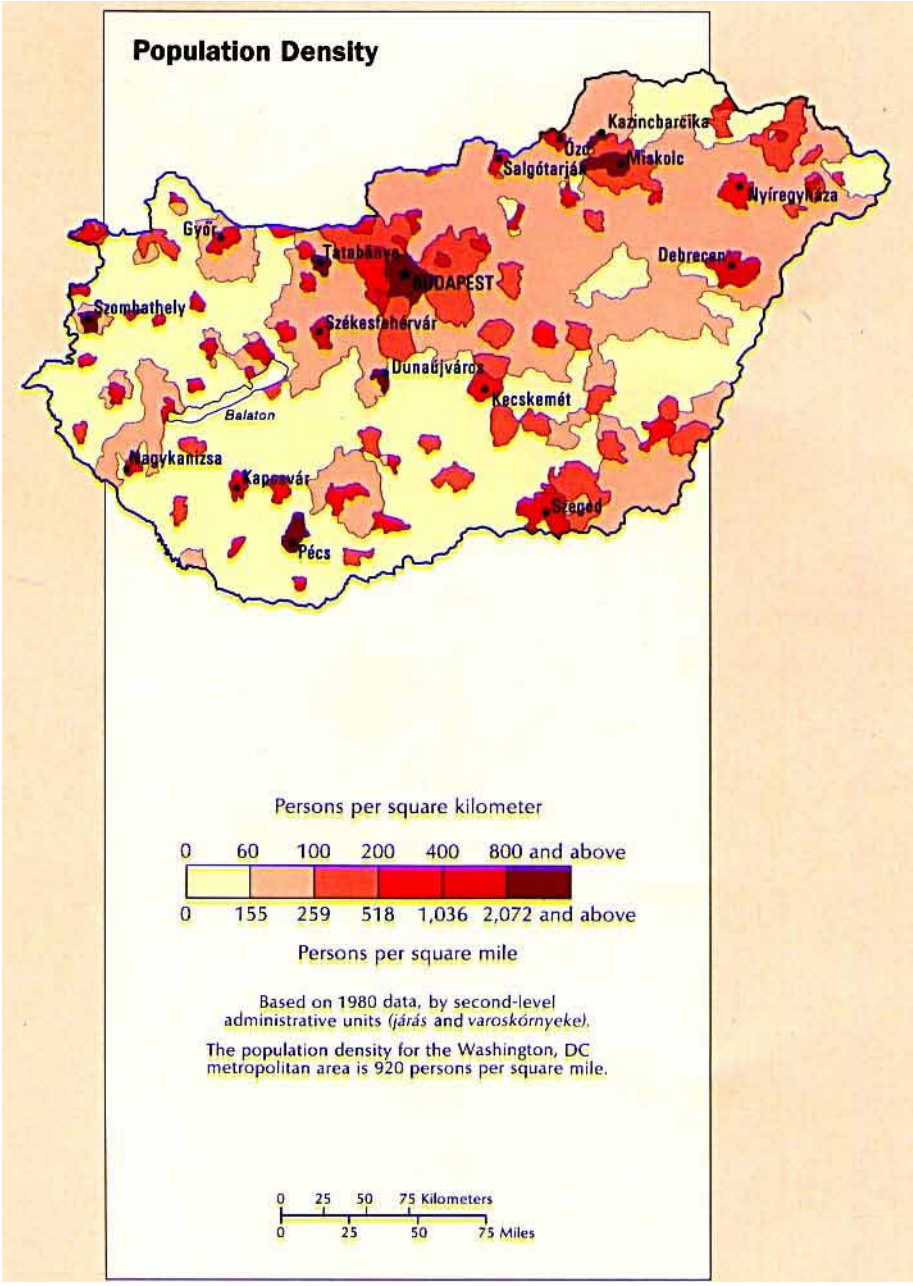
An Environmental History of Water in the Borsod Basin, Hungary, 1945—1980

The history of the economy and the environment in Eastern Europe under state socialism has been a widely researched topic in recent decades. Despite a wide array of works were published on that subject, we know very little precise information on the history of industrial pollution and environmental protection in state socialism. Much of the published accounts are based on anecdotal information and recite the Cold War influenced mantra of "grey landscapes, and polluted lands" in East Central Europe.

In my understanding, to have a new assessment ready on the environmental and economic history of East-Central Europe, first we need to extract new data that has not been available. Only that new data will ensure, that our analysis will be more accurate than the ones carried out by the previous generations of researchers.

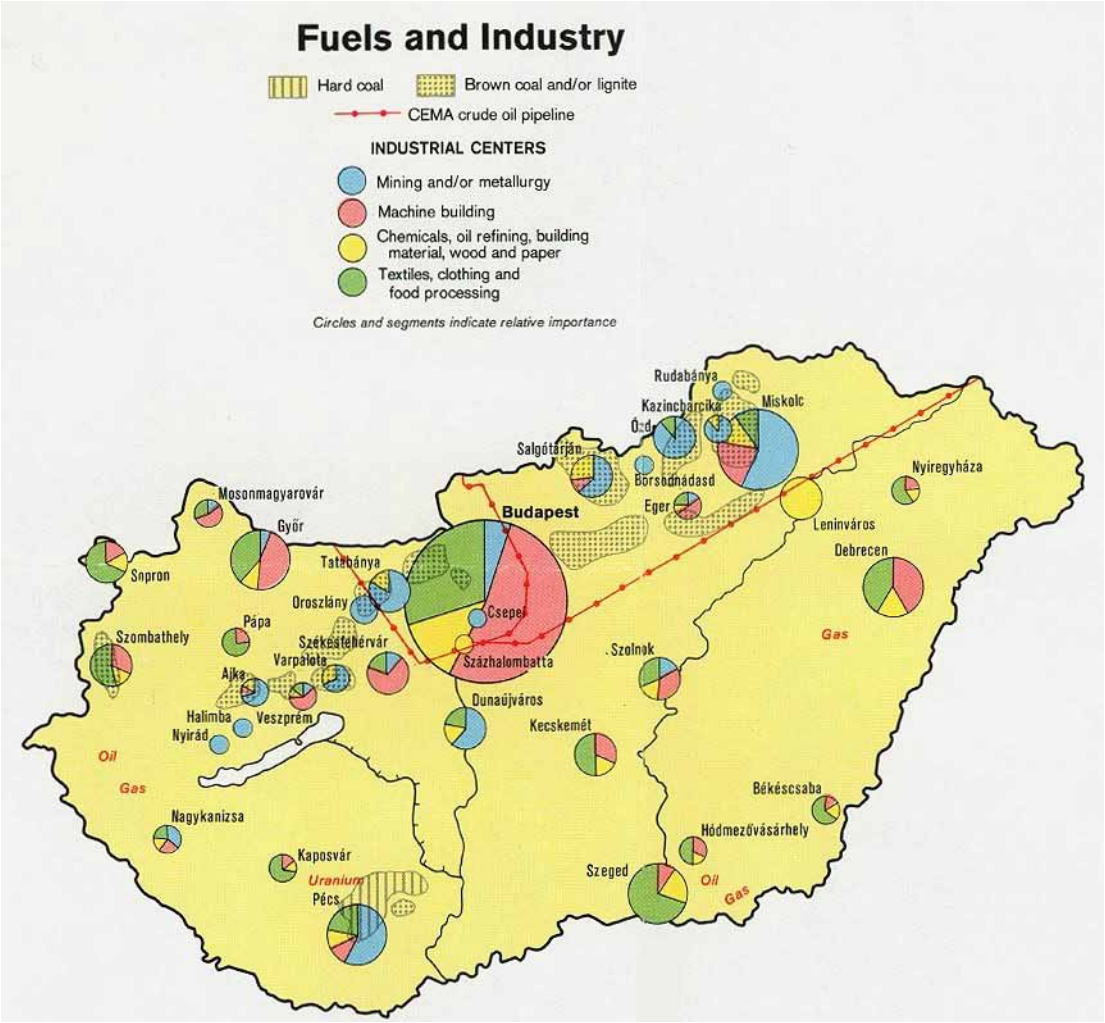
My hypothesis was that even though communism and state socialism were viewed as contradictory production systems to capitalism during the Cold War, in my view they were equally addicted to economic growth as any of the capitalist states in Western Europe. As a result, environmental pollution was inevitable on both sides of the Iron Curtain, because neither the enhancement measures of production efficiency nor end-of-pipe technologies would provide remedy for water pollution problems between the 1950s and 1970s, when heavy industrial and chemical production dominated industrial production in much of the European continent.

Communism was and is still often viewed as a counterpart of capitalism, a contradictory economic system and ideology. But in my understanding growth was equally important for capitalism and communism. As a result of the similar viewpoint toward nature, state socialist countries sought similar ways to manage their pollution problems as capitalist countries. Also the amount of funds for environmental protection was closely connected to the current economic performance in state socialism. So as it has been in capitalism.



I aimed to understand environmental issues via the case study of the Borsod Basin in Hungary. The case study method is a well-established form of scientific investigation that can be used effectively also in the history discipline. According to Robert K. Yin, one of the most influential proponents of the case study method case studies can be successfully implied especially when we ask the questions "'how" and "why", which signal a more *explanatory path* and likely to lead to the use of case studies, histories, and experiments as the preferred research strategies. Using the Borsod Basin case study enabled me to reconstruct environmental discourses ("games") in Hungary between 1950 and 1982. This work also identified key players ("actors") in such discourses.

Discourses in this research do not exclusively refer to linguistic interchanges, but also to games of power and knowledge. Such discourses are key components to understand the dynamics, motivations, and discursive patterns of water pollution and water protection. Discursive analysis enabled me to depict emotional, financial, and professional motivations



and behavior patterns of individuals, production plants, supervisory bodies, and other social and economic groups in Hungary under state socialism, and compare those observations to Western European examples.

Finally, my dissertation work was a regional case study that included three large industrial plants, a large municipal water supply company, several smaller state owned firms and various state agencies, media outlets, civic associations, and individuals as actors.

To prove my points I aimed to find answers to the following questions:

What supply-side measures were taken in Western Europe and in the Borsod Basin to maintain water supply for industry and residential areas, and why?

This question is important, because water scarcity was one of the first results of accelerated industrial production and rapid industrialization. I was keen to see did state socialism had different answers to these problems than capitalist countries or not?

There are two general ways to reduce discharge pollutants per production ton: to increase production efficiency, and to apply end-of-pipe technologies (e.g. waste water treatment plants). This is why I asked my second research question:

Why and how were efficiency measures and end-of-pipe technologies exercised in Western Europe and in the Borsod Basin to reduce the severity of the degradation of water resources?

Environmental policy tools and public pressure played also an important role in the fight against pollution. This is why I was curious **why and how were environmental policy measures exercised in Western Europe and in the Borsod Basin to reduce the severity of the degradation of water sources. How did actors participate in the water pollution and protection discourse in Western Europe and in the Borsod Basin?**

To carry out this research I aimed to use a wide array of sources which included:

- Documents from state archives

- Documents from company archives

- Privately owned documents

- Scientific journals and local daily newspapers

- Interviews with actors of past times

- And existing secondary literature in political, economic, and environmental history.

As a result of my research I found that changes in the valley of the Sajó River followed a uniform pattern of water abuse that was already familiar to the Ruhr and several other industrial areas in Western Europe. The extraction of an additional number of water sources increased and the build up of water storage facilities and water transport infrastructure consumed an increased level of resources.

When old factories were extended and new production plants were constructed the Sajó River became more polluted instanteniously. By the late 1950s, pollution in the Sajó River reached a cirtical level and its water could hardly be used for industrial and municipal purposes. Borsod was caught in a "Catch-22" trap identical to the "water pollution and water shortage" cycle of the nineteenth century and post-World War II Ruhr and other Western European industrial areas.

Water pollution and water shortage issues were answered with the aid of technological and legal fixes in Borsod. These tools and the ideology behind them were identical to solution attempts in Western Europe, regardless of the two contradictory political systems. The Hungarian government began the implementation of new economic policies which were aimed to establish economical water use and efficiency- seeking methods in production.

After 1958, companies in Borsod applied several technological and methodological fixes to curtail excessive industrial water use. Factories in the Borsod Basin received funding to change their source of energy production from coal to natural gas by the end of the 1960s. This process was part of the energy modernization scheme based on domestic and imported natural gas and crude oil. The gradual abandonment of coal had multiple positive impacts in air and water quality from the second half of the 1960s.

Parallel to the economic modernization in Hungary in the 1960s, some degree of environmental protection was also in the interest of the state socialist regime. This was because

in a planned economy, factories wasted state resources when they discharged by-products (pollution) to water and air. Released by-products should have been somehow recycled into the production process to reduce the economic loss of the state.

The Kádár regime suffered financial losses not only when by-products remained unused and discharged but released pollutants changed the biological and chemical features of water courses. This may have resulted fish kills and the reduction of water quality. In addition, discharged wastewater jeopardized safe water intake downstream to polluting factories and reqired further investment from the state, when kilometers-long water supply pipelines were constructed to supply urban centers with water from less polluted water sources.

The Hungarian system of wastewater discharge fines was very similar to water monitoring and protection systems installed in Western Europe. The one big difference was the reduced space for discourse by non-state sponsored actors. The Hungarian system was solely state owned. Players in the game: scientists, engineers, state servants, journalists, and factory staff were all on the payroll of the state socialist state. This undoubtedly resulted a less flexible environment for waste water discourses. On the other hand, when the required will was possessed on the political level, legistlative and technological changes were carried out with incredible speed.

After 1968, rather liberal economic reforms took place in Hungary. Conjointly, the 40/1969 Governmental Order restructured and restricted water pollution calculation methods and rapidly decreased wastewater discharge limits. Under the new set of rules, Regional superintendents successfully facilitated and intimidated for cooperation those industrial plants which previously had neglected environmental regulations. After 1969, new, end-of-pipe technologies reached relatively high standards of effectiveness. Some of these new environmental projects were comparable to Western European end-of-pipe technologies. The BVK, for example, invested 1 billion Ft on water protection between 1975 and 1979. This was 10 percent of BVK's total development budget during the same period. The BVK was unique, but not a single standing case in Hungary. Several chemical factories received large environmental investments. In addition, some of the old iron and steel units also received effective end-of-pipe technologies.

During the 1960s, Hungarian environmental attitudes changed considerably. Such a change was both self-sustained and facilitated by the state. A class of environmental state servants emerged in the 1960s. They were followed by engineers who specialized in environmental issues in production plants. These engineers did not receive environmental engineering education at university, but would specialize in pollution-, and waste management issues in their master thesis, so as János Latorczai did.

In the 1950s water quality concerns were restricted to a group of professionals in the Borsod Basin. Public concern over water pollution rose only in the case of the Szinva creek. This changed by the mid-1960s radically. Then water pollution of riverflows in Borsod emerged as an issue of public debate in local dailies. Local environmental debates closely resembled local debates on river pollution in Western Europe where until the late 1960s water pollution did not emerge as a national environmental concern and debates of pollution were mostly confined to local media platforms.

Public concern orchestrated by the state socialist regime was the predecessor of the establishment of Borsod's first independent environmental association, the Borsod County Natural Protection Association in Miskolc in 1981. This association did not aim to function

within limits set by the state. It actively criticized environmental practices of state enterprises in the valley of the river Sajó in the 1980s and gained national popularity within a very short time.

Inspite of the rising importance of public environmental concerns, "mainstream rationality" dominated discourse in Borsod throughout the research period and beyond. This has not been different in Western Europe. Mainstream rationality has supported growth and "development." Even though a huge upheaval in environmental concerns was observed since the 1970s, the management of environmental issues remained in the faulty frame of technological fixes and efficiency improvements on a global scale. In Borsod, we have seen both the installation and implications of technological fixes and efficiency improvement.

These "solutions" have been intertwined with the economic performance of economies. Without "endless accumuluation" and growth, effective environmental protection was impossible both in Western Europe's "state coordinated capitalism" and in East-Central Europe's state socialism. When there is growth, technological fixes and end-of-pipe technologies are implemented with a counterproductive result, because these environmental investments can never catch up with the growth of pollution from new industries. When there is stagnation and decline, population is reduced on its own, without intervention.

The Oil Crisis of 1973 did not hit the Soviet bloc hard immediately, but slowly had devastating financial effects in East-Central Europe. Between 1973 and 1982, East-Central European countries were able to obtain cheap credits from OPEC countries and Western creditors. Credits helped to run sluggish economies and helped to provide adequate funding for industrial and environmental investments.

By the beginning of the 1980s Hungary and Poland were both on the brink of bankruptcy and did not to recover during that decade. The steady decline of state socialist economies brought deteriorating quality of services in all walks of life, including declining environmental protection funding and practices. By the end of the 1980s - during the agony-days of state socialism – a large number of Western scholars were able to observe environmental practices of state socialist countries and they found devastating conditions. Their observations were justified for the late 1980s, but then would be generalized for the entire 45 year period of communism and state socialism in East-Central Europe.

The state socialist system revealed the problems of the capitalist economy in a greater form. Without growth the state socialist system died. The system of technological fixes produced some results in state socialism but could not solve pressing environmental problems.

In my view the collapse of state socialism showed us, that we cannot choose between economic growth and environmental protection. We need to address these two questions simultaneously and abandon the delusion, that technological fixes can provide "sustainable development" in the future.

International Environmental History Group (IEHG)

Finland is often called as the land of a thousand lakes; in fact there are some 180,000. Therefore, we are very proud of our natural heritage and we do live close to water and nature. The home town of IEHG is Tampere, which has a long history of pulp, paper and textile industries. Despite of her smoky past and dozens of downtown chimneys, today, our city is a dynamic centre of education, research and business, aiming to a sustainable future.

The IEH Group was set up on a chilly winter afternoon in early 2001. Their aim to research and promote different subdisciplines of environmental history. Dr. Petri S. Juuti is the head of the IEHG. The home university of IEHG is University of Tampere. At the moment, Petri Juuti, Harri Mäki, Riikka Rajala, Vuokko Kurki, and Viktor Pál are the members of IEHG. Their aim to research and promote different subdisciplines of environmental history.

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Capacity Development in Water and Environmental Services
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Research team on Water Services

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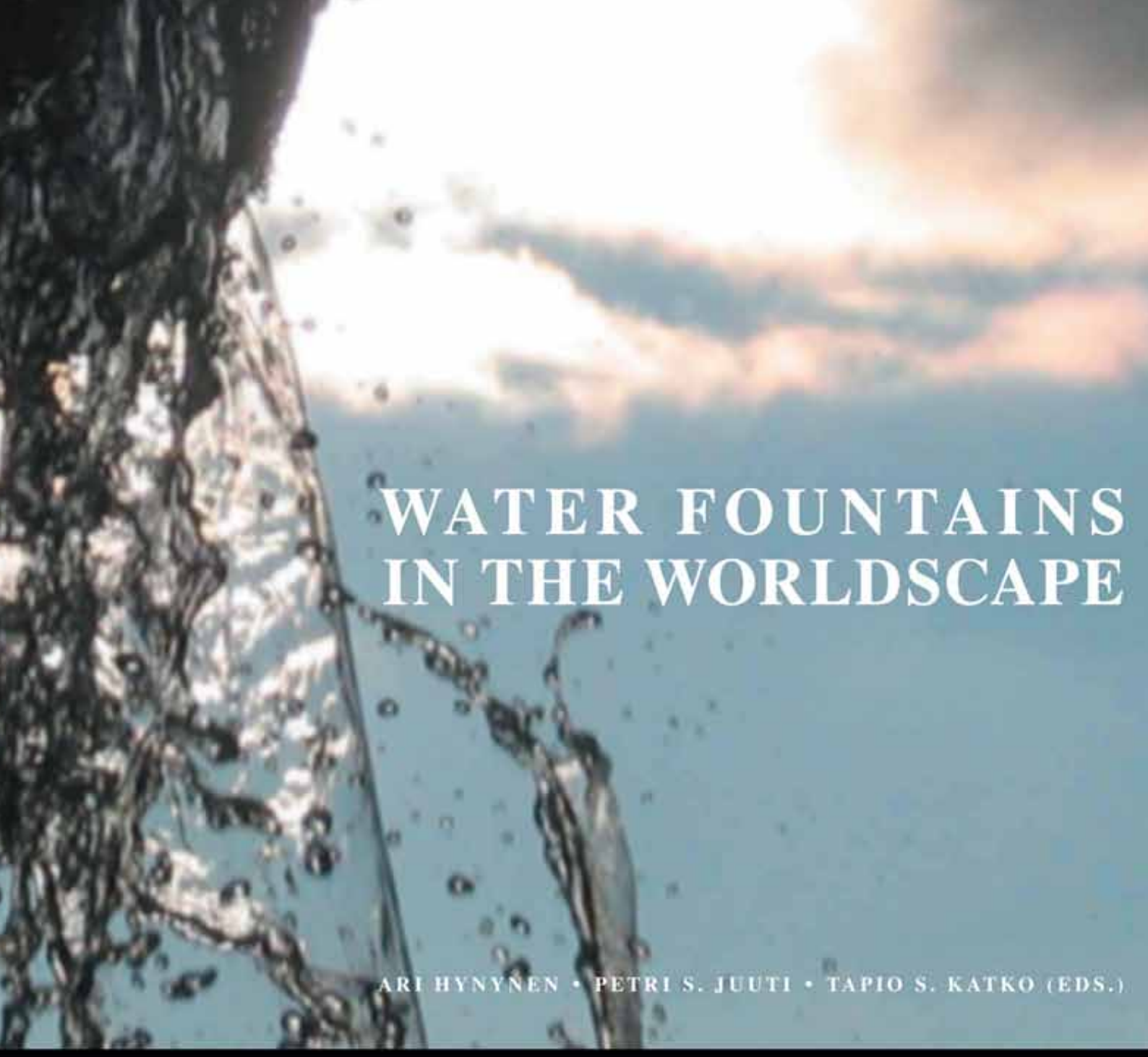

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